Tag User Manual

Draft version 1.6

Sea Mammal Research Unit

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1 INTRODUCTION

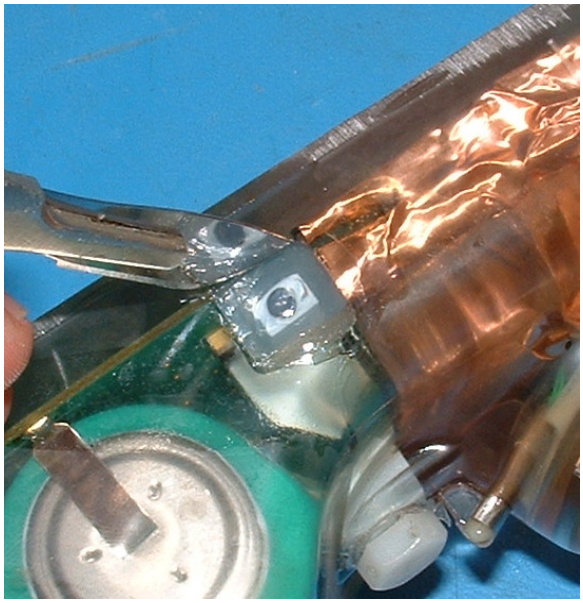
2 CONNECTING A TAG TO A PC

2.1 Preparing the Tag

2.1.1 Old Hitachi

For tags which use the old Hitachi, i.e. those for which the main printed circuit board is green rather than blue.

Use a scalpel or equivalent, score a groove between the silicone rubber and the epoxy on the connector and carefully dig out the silicone rubber.

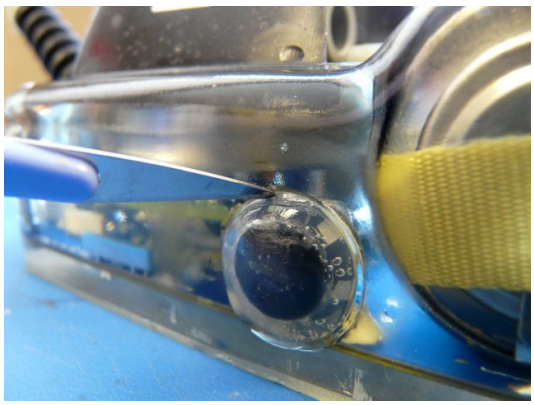


Use an allen (hex) key, remove the small grub-screw in the end of the connector plug and replace with an M3 bolt. Extract the connector plug by pulling on the bolt.

Remove surplus silicone rubber. Pay particular attention to the pins to ensure silicon rubber is not coating the pins otherwise there will be a poor contact with the connector. Avoid bending the pins.

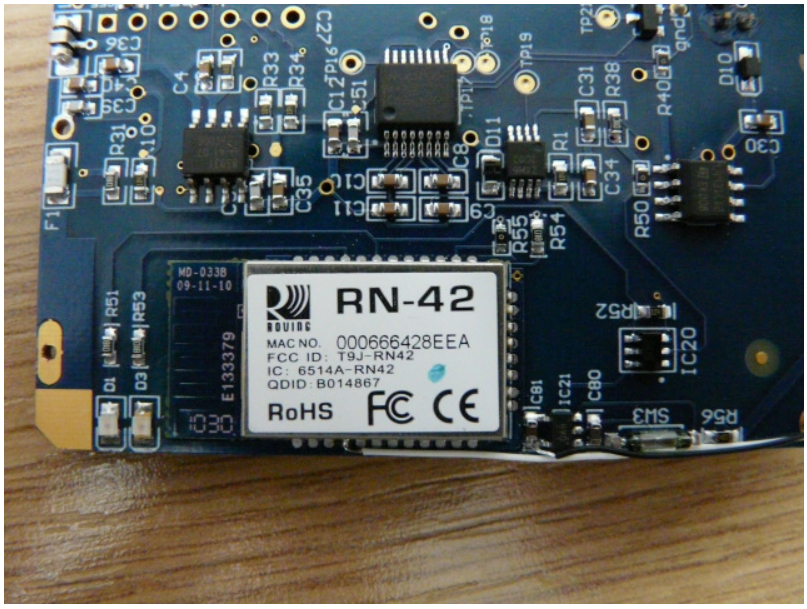
2.1.2 New Hitachi

For tags which use the new Hitachi processor (i.e. those with a blue printed circuit board rather than green), the connector is a 9-pin circular (or occasionally 4 pin) connector rather than a 5-pin rectangular connector.



The method of extraction is the same, i.e. use a scalpel to score around the edge of the silicon, extract both the silicon and the black socket protection plug using either a set of pliers or preferably the blade of a screwdriver.

The latest iteration of tags however use a PCB with no externally accessible connector. Instead, once potted, these utilise a Bluetooth interface. These are readily identifiable by virtue of the fact that the test connector is back-filled with epoxy resin. The Bluetooth module is also clearly identifiable on the underside of the tag as the 'RN-42' device, thus:



2.2 Connecting the cable

2.2.1 Old Hitachi

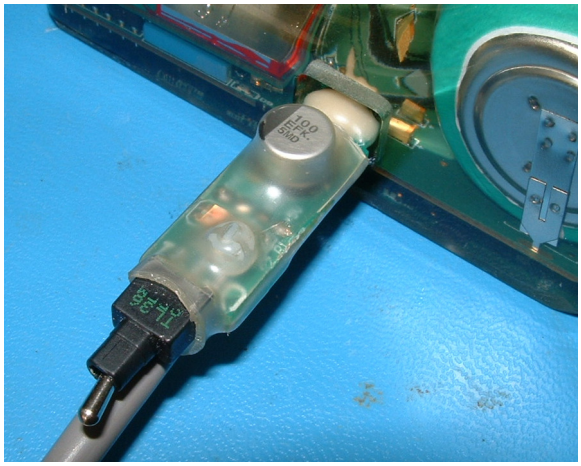
There are two possible variants of cable for tags which use the old Hitachi processor but the principle of operation is the same. The first cable uses a 9-way 'D' type socket and USB port to connect the programming adapter to the PC, the second uses only a USBa/b cable to connect to the programming adapter to the PC – see images below.

For the first variant, connect the D-connector to a serial port on the PC, and connect the USB connector to the PC.

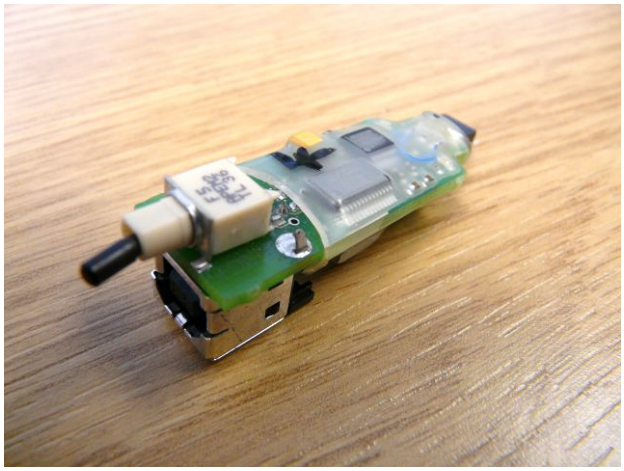
For the second variant, connect the programming adapter to the USB port of a PC using a standard USB a/b cable.

For either connector, One of the two lights contained in the potted connector should now be illuminated, indicating that power is connected. The second light indicates that the connection is active. With the connector positioned so that the switch is above the cable and the cable is towards you, toggle the switch to the right so that the second light is OFF.

Connect the black end of the potted connector to the port on the side of the tag, aligning the blank in the connector with the missing pin in the port.



Variant 1



Variant 2

2.2.2 New Hitachi

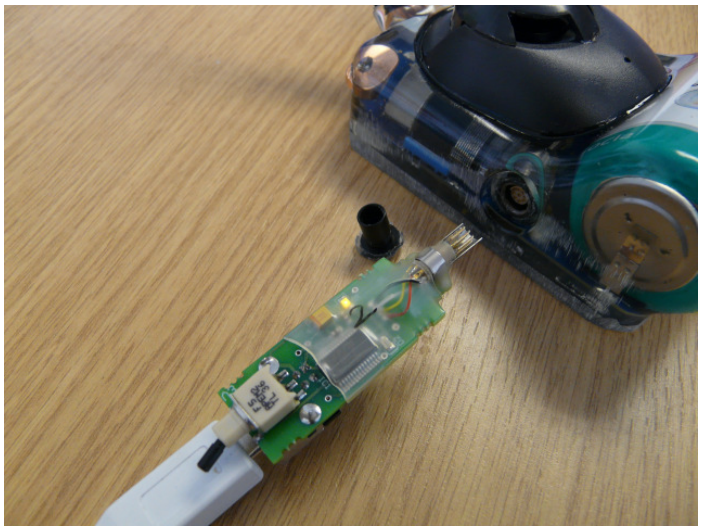
There are two variants of cable for tags which use the new Hitachi processor, either 9-pin circular, or in exceptional circumstances 4-pin circular.

More recently, tags are being manufactured which use only a Bluetooth interface – a test connector is used during manufacturing but is back-filled with epoxy resin prior to final test and delivery. The same capability still exists however for modification using TagConfig and re-programming. For this, refer to section 2.6.

Connect the programming adapter to the USB port of a PC using a standard USB a/b cable, as shown in the photo below.

The orange light should now be illuminated indicating that power is applied to the adapter. A second red light indicates that the connection is active. With the connector positioned so that the switch is above the cable and the cable is towards you, toggle the switch to the right so that the second red light is OFF.

Connect the half-round end of the potted connector to the port on the side of the tag, aligning the half-moon in the connector with the missing half-moon in the port.



2.3 Downloading TagConfig

Download “tagconfig” from the downloads section of the web page, copying the whole ‘Configuration’ folder across.

The downloads section is located thus:

http://www.smru.st-and.ac.uk/protected/downloads.html

Do not run directly from a CD since the program will be unable to write to its log files.

Depending upon the version of Windows, it may be necessary to run the program as a user with Local Administrator rights to get proper access to the serial port.

2.4 Installing USB Driver

Most PCs already have the correct USB driver for the second variant of programming cable. If the PC does not automatically recognise the USB device when the cable is plugged in to the PC’s USB port then the USB driver must be installed on the PC, as follows:

Download the USB driver from the SMRU downloads page:

http://www.smru.st-and.ac.uk/protected/downloads.html

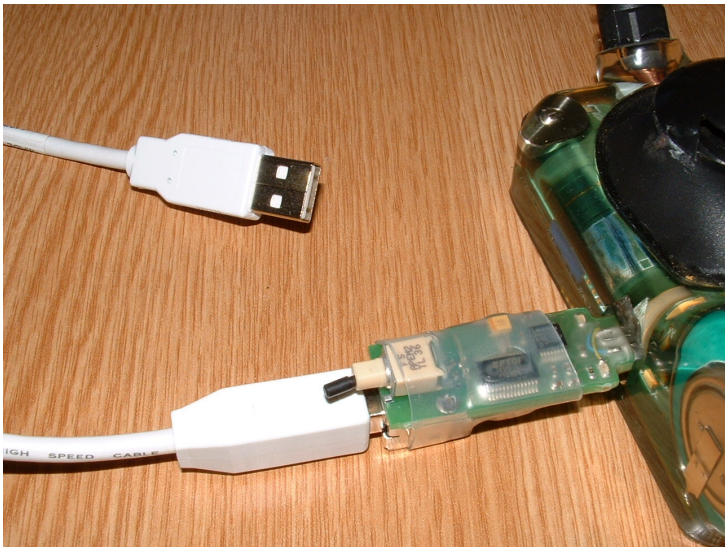
Use the mouse to double click on the downloaded executable.

Restart the PC.

2.5 Configuring the USB Programming Cable

The following section details how to configure the USB programming cable and adapter to either a laptop or PC equipped with a USB port:

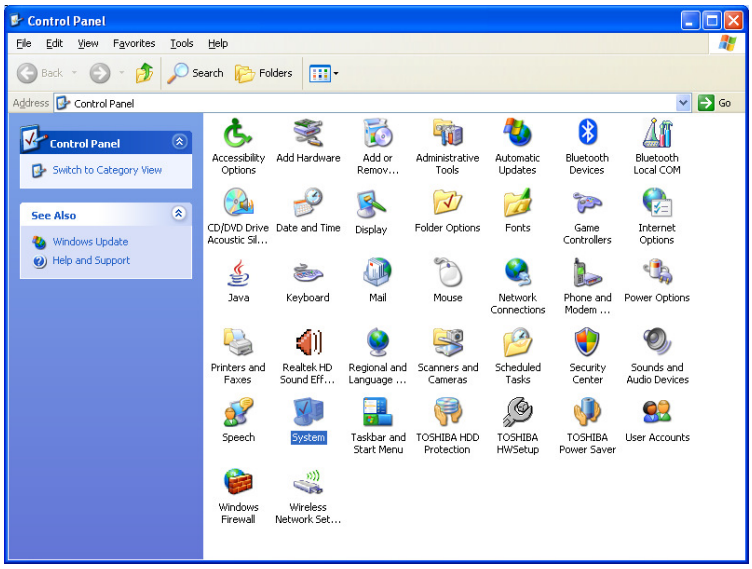
Connect the USB adapter to the tag – Note this connector is keyed (the switch should be uppermost and in the position indicated in the photograph above).



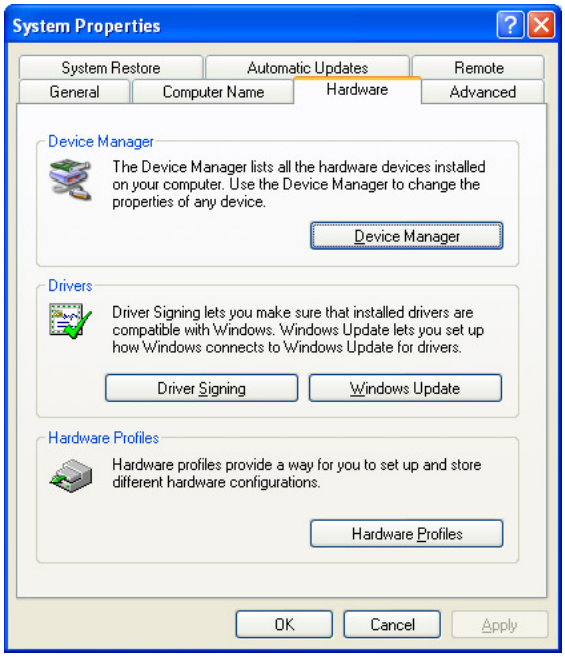
Connect the USB adapter to the USB port of a PC using the cable provided.

Navigate to the PCs Hardware Device manager, as follows:

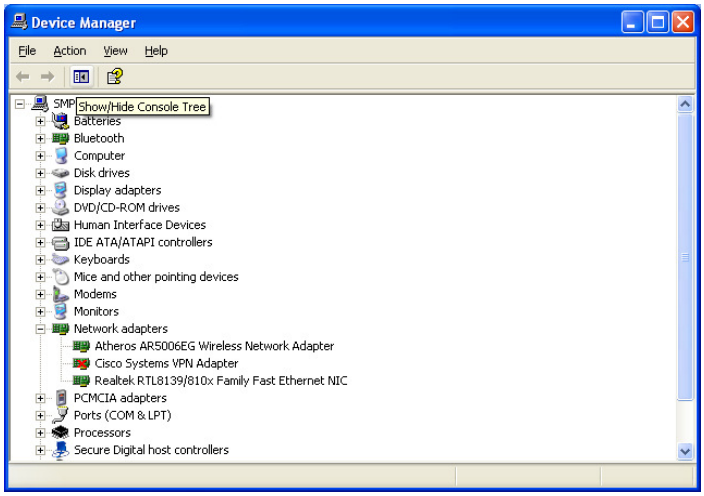
Open the PC Control Panel:



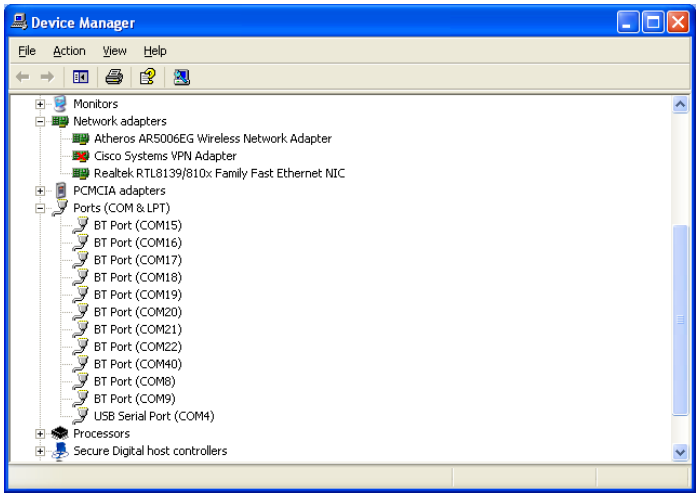
Double click on **System**:


System Properties
System Restore
Automatic Updates
Remote
General
Computer Name
Hardware
Advanced
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Device Manager
Drivers
Driver Signing lets you make sure that installed drivers are compatible with Windows. Windows Update lets you set up how Windows connects to Windows Update for drivers.
Driver Signing
Windows Update
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles
OK
Cancel
Apply

Press **Device Manager**, the window should look something like the following:

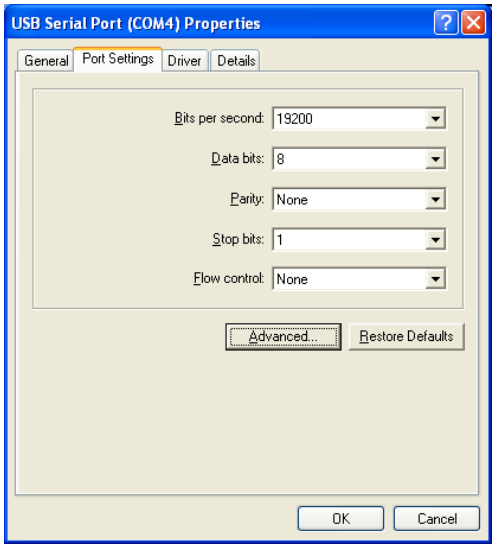


Scroll down to **Ports (COM & LPT)** and click on the + sign to show the details:

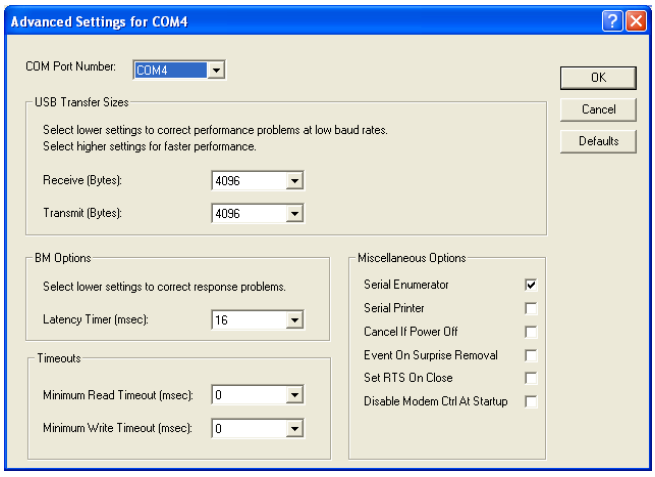


USB serial port should be visible if the USB adapter is plugged in to the PC. This is **COM4** in the example above.

Double click on the **USB Serial Port** corresponding to the programming adapter and select the **Port Settings** tab. Ensure the parameters are as shown below:



Click **Advanced** and ensure the parameters are as shown below:

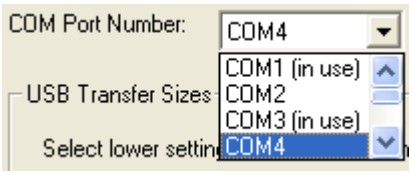


The COM port number may differ from that shown above:

The acceptable range for TagConfig is between 1 and 99 inclusive.

- To reprogram a tag, the COM port must be 1, 2, 3 or 4 – this is due to the limitations of the existing Hitachi programming software. The software for the new Hitachi programmer should be able to handle larger COM port numbers.

The COM port number may be changed using the drop-down icon in the **Advanced Settings** window, as shown below:



If COM ports 1-4 are in use then it will be necessary to uninstall one (select one already assigned to overwrite) before the programming adapter can be used for reprogramming a tag.

Press 'OK' for the **Advanced Settings**, then 'OK' for the **USB Serial Port Properties**, then close the 'Device Manager' and 'Control Panel' windows.

2.6 Bluetooth

More recent tags tags are equipped with Bluetooth to facilitate wireless communication with a tag. The following subsections detail how to install and run Bluetooth from a PC using:

Blue-soleil Micro-USB Dongle

Toshiba Bluetooth Stack

Note 1: In almost all instances, it is the Blue-soleil installation which should be followed. The Toshiba Bluetooth stack is more of a historical artefact and its inclusion here is for the odd tag in the early stages of it's development.

Note 2: The USB dongle provided is licenced with the Blue-soleil software to allow for unlimited data transfer. If another dongle is used with this software then data transfer is restricted to 2Mb.

Note 3: It is only possible to program a tag via blue-tooth using the micro-USB dongle and the associated Blue-soleil software provided. No other software or driver will work (the tag programming software will only work with a Bluetooth driver which supports a virtual COM port).

Note 4: Tag programming via Bluetooth is only possible for COM ports from 3-5.

2.6.1 Blue-soleil Micro-USB Dongle

2.6.1.1 Installation

Installation of the software requires several PC re-boots so it is advisable to close all other applications before commencing with the installation.

Use Add/remove programs in the control panel to first remove all previous Bluetooth Installations – conflict can occur between different Bluetooth drivers, then re-start the PC.

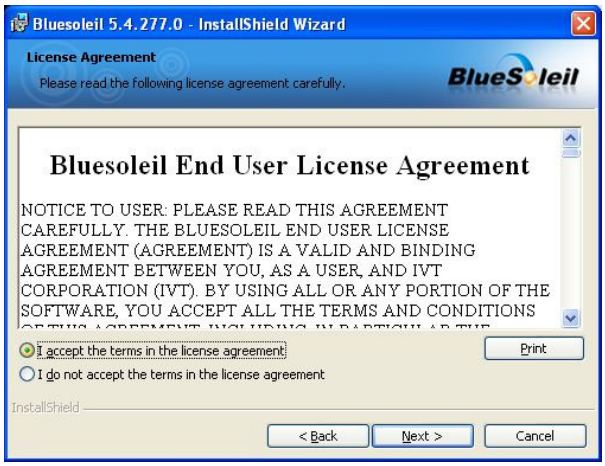
Install the Blue-soleil software from the mini-CD provided. Use default settings, when prompted. The following is the installation sequence:

Select the appropriate language from the drop-down menu and press ‘OK’.

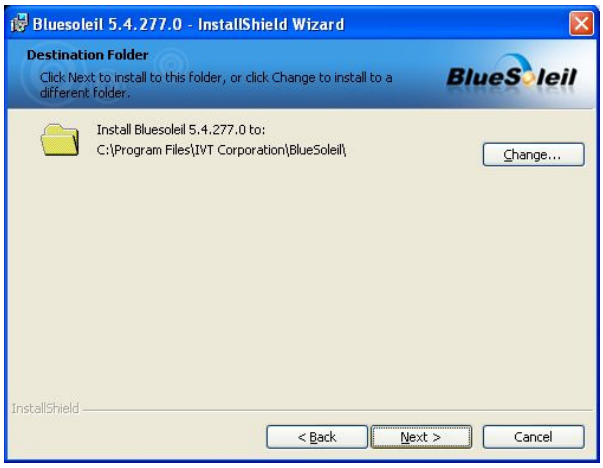
Select ‘Next’ when prompted.

Bluesoleil 5.4.277.0 - InstallShield Wizard
Welcome to the InstallShield Wizard for Bluesoleil 5.4.277.0
The InstallShield(R) Wizard will install Bluesoleil 5.4.277.0 on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
BlueSoleil
< Back
Next >
Cancel

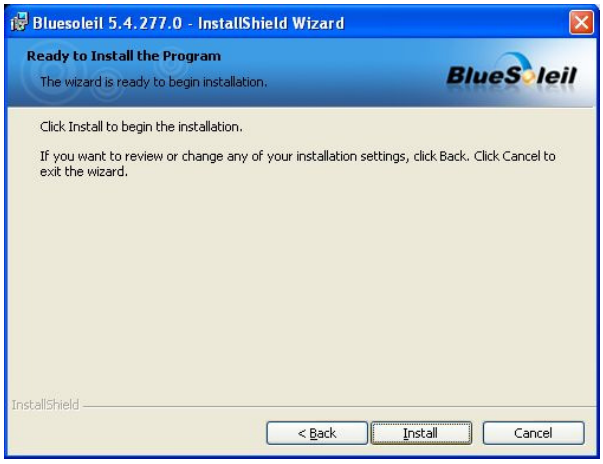
Tick the ‘Accept Licence Agreement’ button and then press ‘Next’


Bluesoleil 5.4.277.0 - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
BlueSoleil
Bluesoleil End User License Agreement
NOTICE TO USER: PLEASE READ THIS AGREEMENT CAREFULLY. THE BLUESOLEIL END USER LICENSE AGREEMENT (AGREEMENT) IS A VALID AND BINDING AGREEMENT BETWEEN YOU, AS A USER, AND IVT CORPORATION (IVT). BY USING ALL OR ANY PORTION OF THE SOFTWARE, YOU ACCEPT ALL THE TERMS AND CONDITIONS
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

Select ‘Next’ when prompted

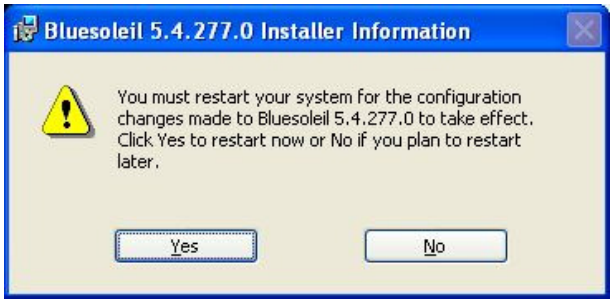


Select ‘Install’ when prompted to commence software installation.


Bluesoleil 5.4.277.0 - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
BlueSoleil
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

When installation is complete, press the ‘Finish’ button.

Re-booth the PC by pressing the ‘Yes’ button.


Bluesoleil 5.4.277.0 Installer Information
You must restart your system for the configuration changes made to Bluesoleil 5.4.277.0 to take effect. Click Yes to restart now or No if you plan to restart later.
Yes
No

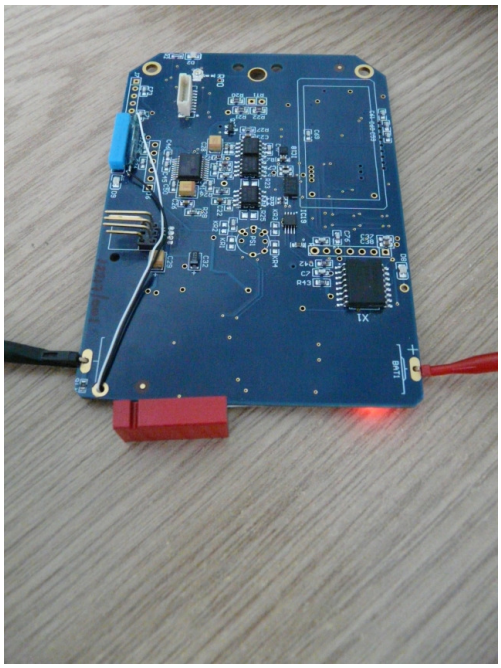
2.6.1.2 Connection to Bluetooth

Insert the Dongle provided in to one of the PC's USB ports and allow time for the PC to recognise the new device.

A Bluetooth symbol ( ) should be evident in the corner of the desktop.

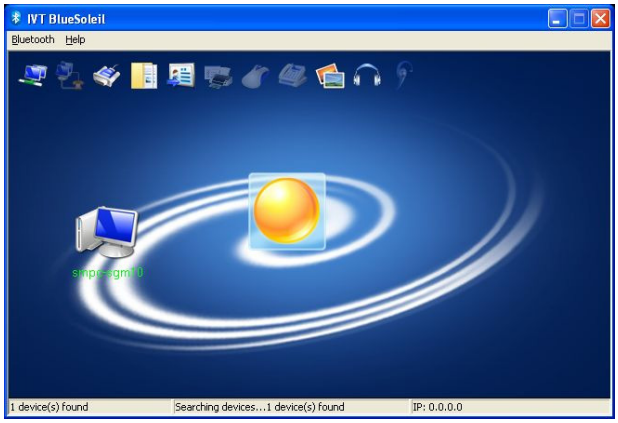
Hover the mouse over the Bluetooth icon and use the mouse button (usually right side) to open the menu, select 'Turn on Bluetooth'. **Note** – the device may automatically turn-on when the device is inserted into the PC.

Place a magnet behind the tag, on the left-hand side (as shown) – a red LED will flash once per second then the magnet has successfully engaged the Bluetooth.

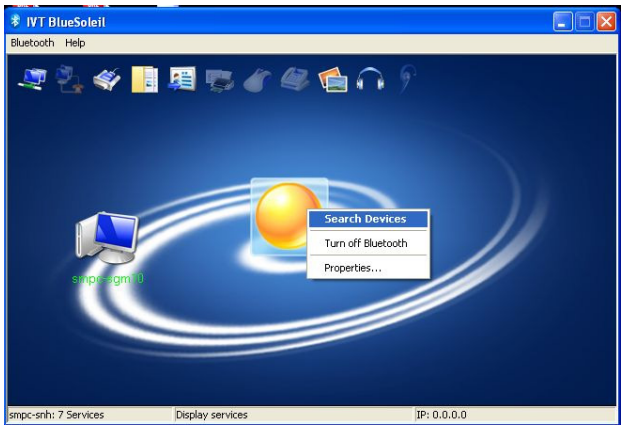


Hover the mouse over the Bluetooth icon and use the mouse button (usually right side) to open the menu, select 'Display Classic View'

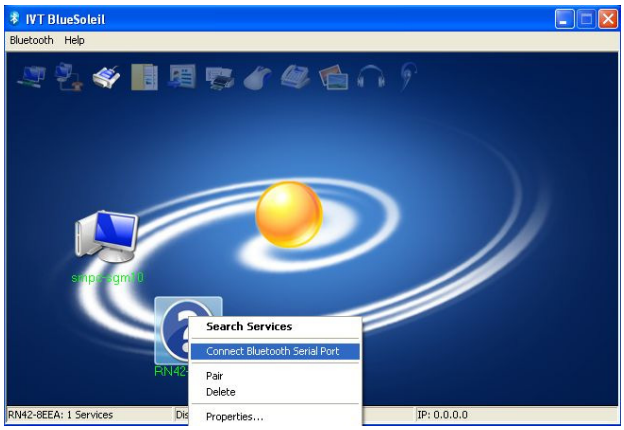
A new window will open and the Bluetooth device will search for all devices within range.



A manual search can be made using the mouse – using the right-hand button, hover over the orange disc and select 'Search Devices'

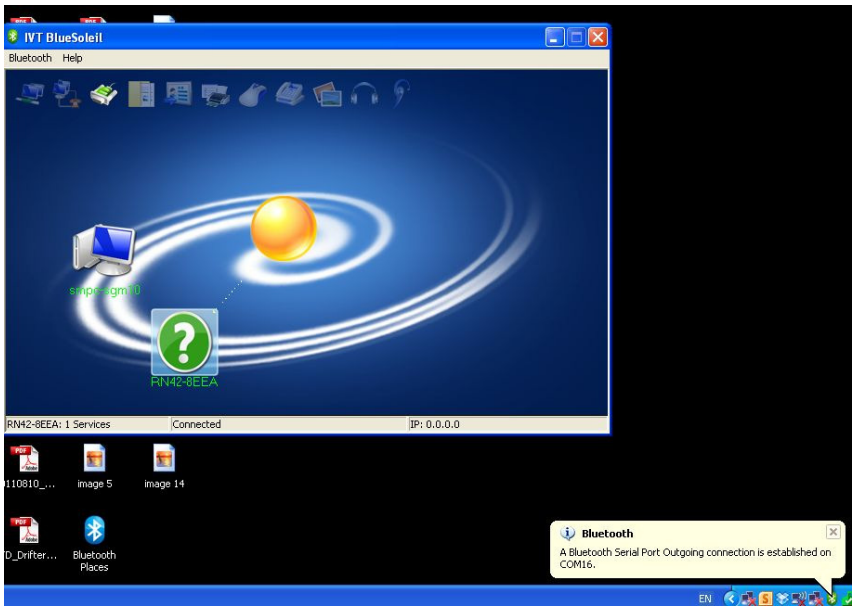


Use the mouse to double-click on the tag device (tags are generically identified as RN42…). With the mouse over the device, use the right hand mouse button to select 'Connect Bluetooth Serial Port'.



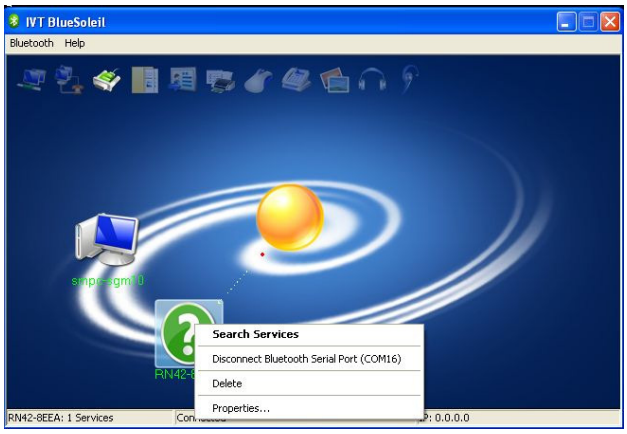
A new COM port will be created, and identified in a pop-up menu. The 'device' will change to a green colour. The LED on the back of the tag will also change from a red

flash to a continuous green. In the following example, the software has automatically chosen COM16 for the Bluetooth device.



Once the Bluetooth link is established it is possible to use TagConfig to view and set the various tag parameters, provided the appropriate COM port is selected in TagConfig. Valid ranges are from 1-99.

Note 1: Each connection to a different tag will result in a new icon on the screen. To simplify when using with many tags, it would be advisable to delete a tag from the window when finished using. This is achieved by using the right-hand mouse button over the appropriate icon and selecting ‘Delete’, as shown:



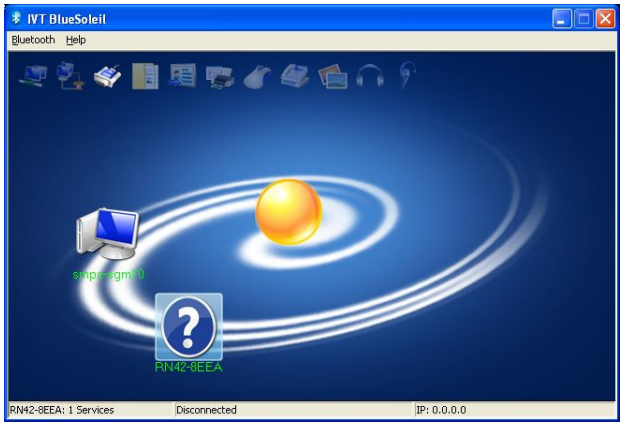
Note 2: To re-program a tag only COM ports between 3-5 may be used. This is a restriction imposed from the programming software. It may therefore be necessary to change the COM port from the ‘automated’ value initially assigned by the BlueSoleil software.

The following details how to re-assign a COM port.

2.6.1.3 Re-assigning a COM Port

From an established link, use the right mouse button to select ‘Disconnect Bluetooth Serial port’. In the example below, the established connection was COM port 16.

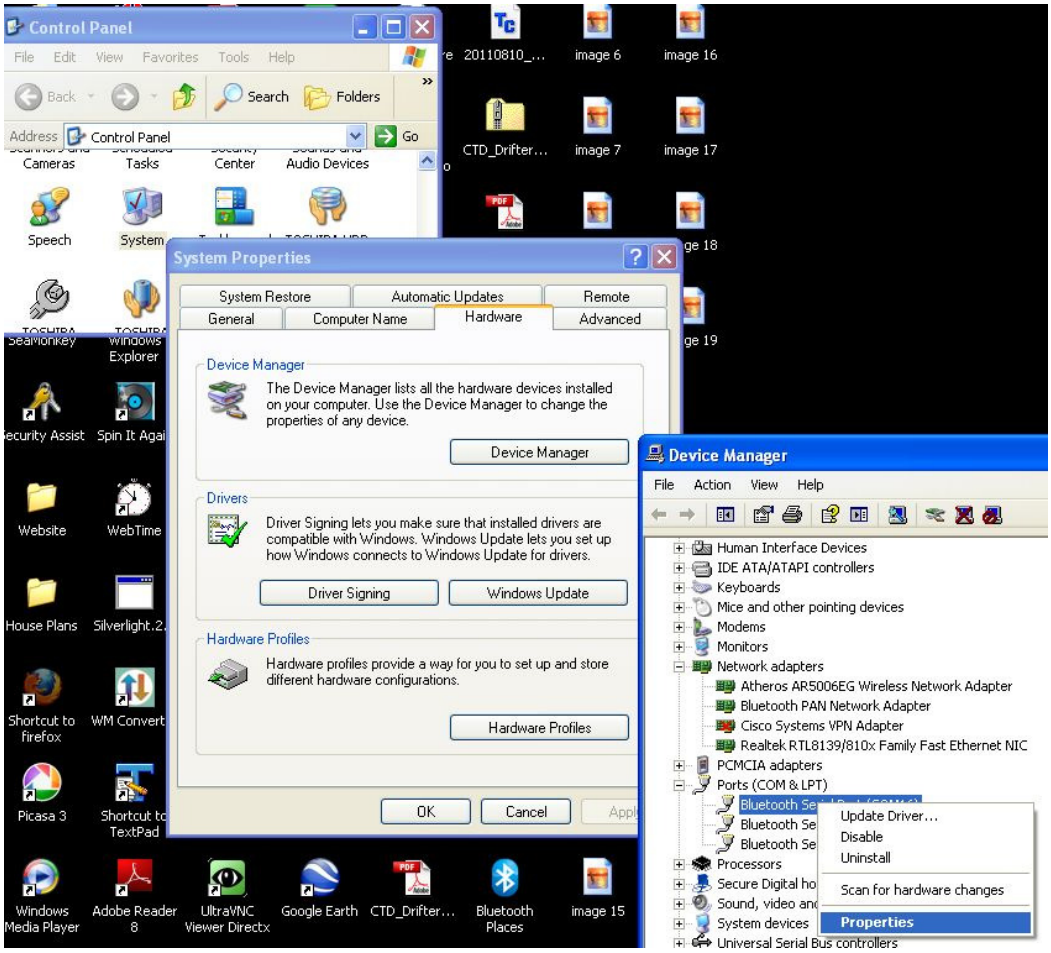
The icon will change from green to blue and the LED on the back of the tag will turn from a continuous green to a flashing red, once a second.



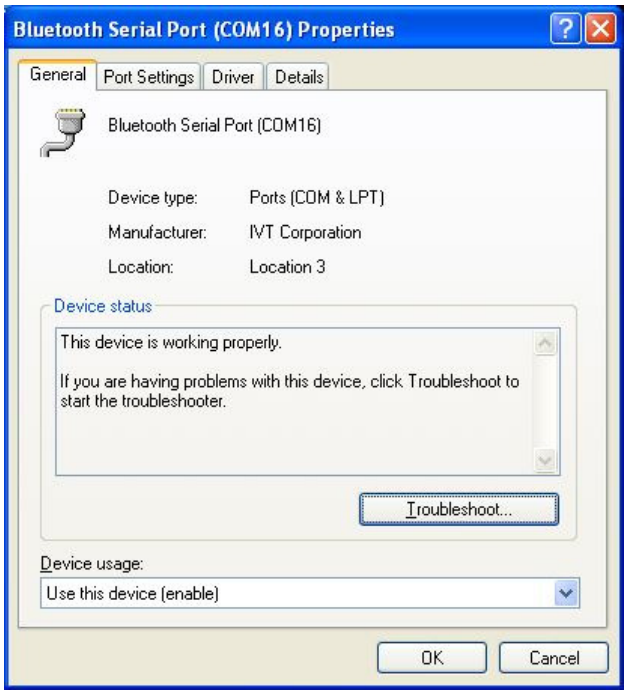
Close the Blue-soleil application.

Via the Control Panel, navigate to the ‘Ports’ sub-menu (Control Panel -> System Properties -> Device Manager -> Ports) – see below.

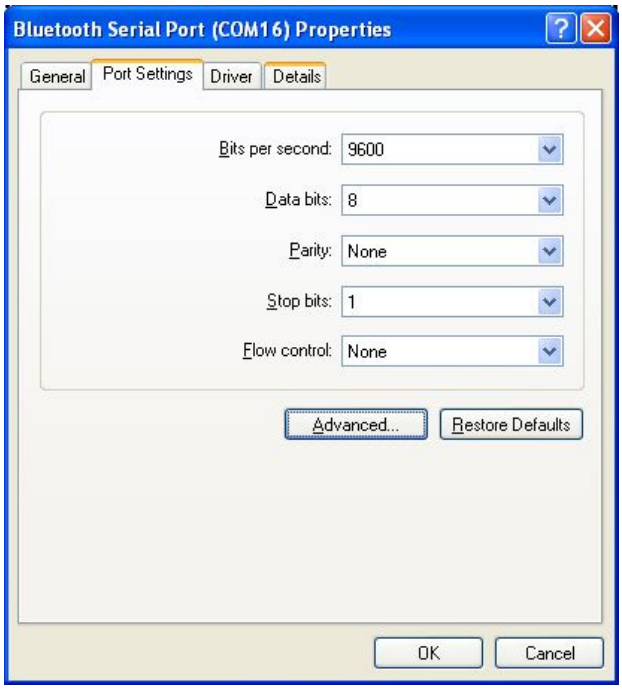
Select the COM port which the Bluetooth device identified (in the above example, this was COM 16) and use the right mouse button and select ‘Properties’.



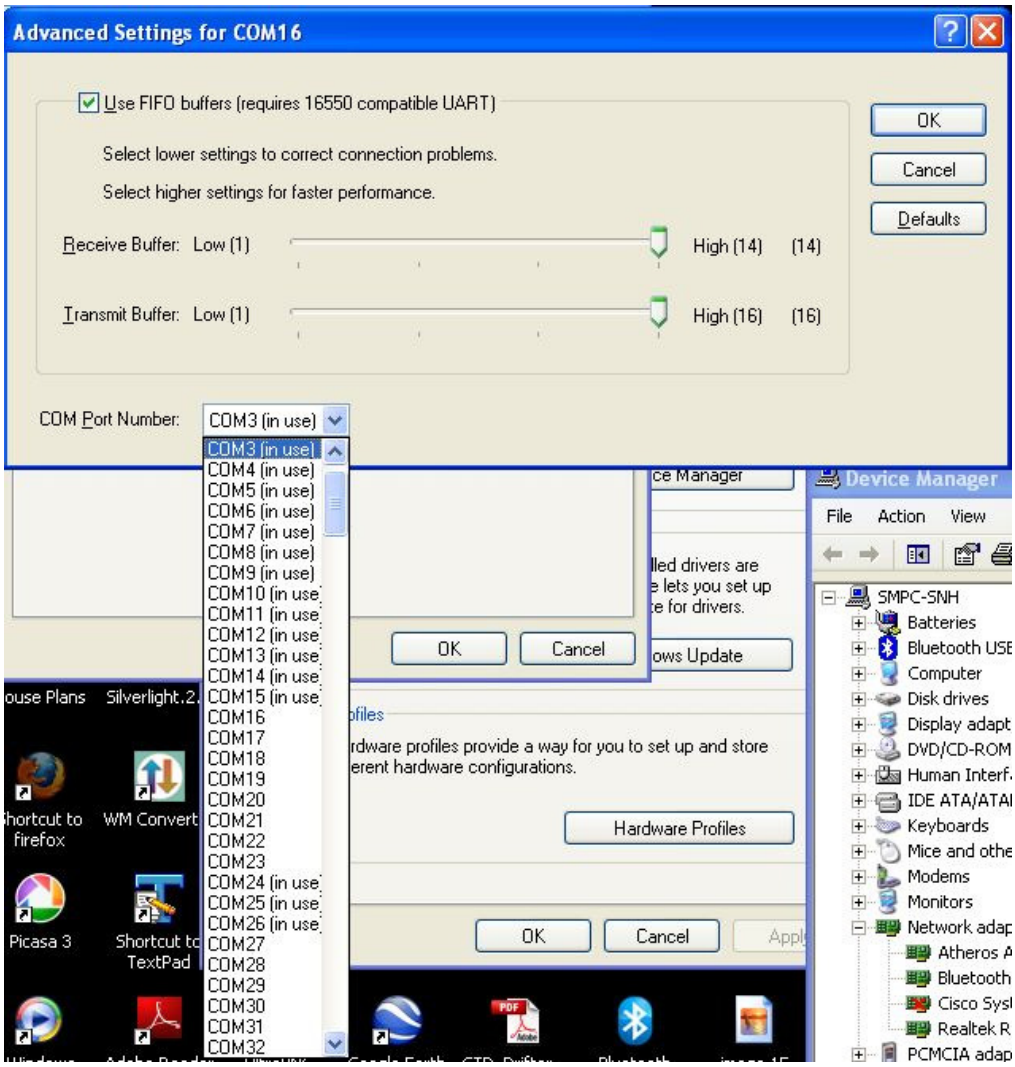
A new window will open corresponding to the Bluetooth COM port. Select ‘Port Settings’ from the tab menu.



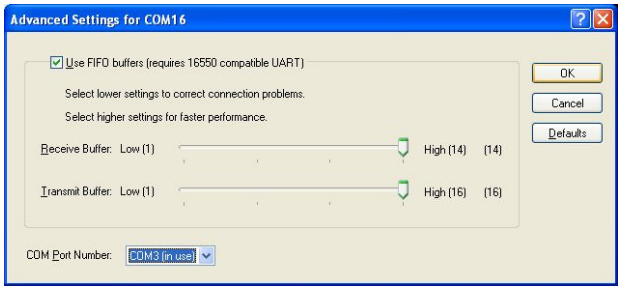
Select ‘Advanced’



Use the drop-down menu to Set a new COM port number, recommended values are 3, 4 or 5. Ignore the fact that the port may already be in use.



Press ‘OK’


Advanced Settings for COM16
Use FIFO buffers (requires 16550 compatible UART)
Select lower settings to correct connection problems.
Select higher settings for faster performance.
Receive Buffer: Low (1) High (14) (14)
Transmit Buffer: Low (1) High (16) (16)
OK
Cancel
Defaults
COM Port Number: COM3 (in use)

Press ‘Yes’ if prompted in a ‘Communication port Properties’ window.

Communications Port Properties
This COM name is being used by another device (such as another com port or modem). Using duplicate names can lead to inaccessible devices and changed settings. Do you want to continue?
Yes
No

Close the ‘Bluetooth Serial Port Window’ by pressing ‘OK’, then close the ‘Device Manager’, ‘System Properties’ and ‘Control Panel’ windows.

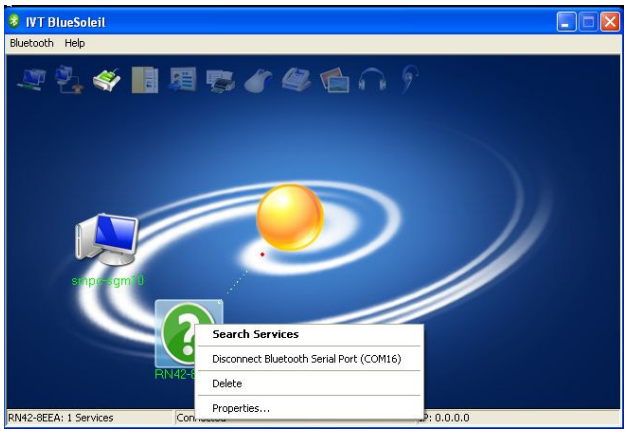
Restart the PC.

The Bluetooth should now operate as detailed in Section 2.6.1.2, with the new COM port selected.

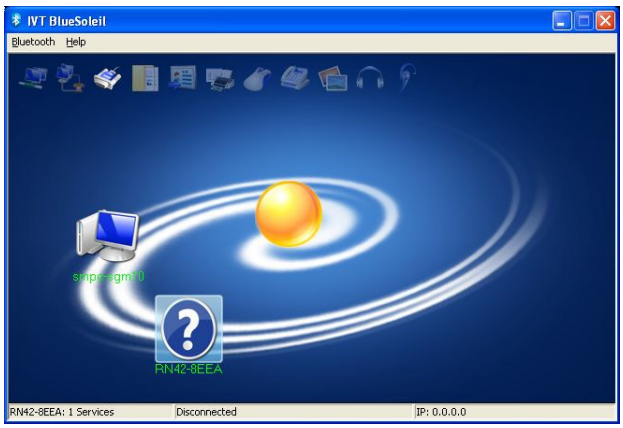
Note: In exceptional circumstances an error may occur when trying to reconnect when using the new COM port. If this occurs then use 'Device Manager' to re-asign to one of the other two COM ports which are available (remember; 3, 4 or 5 is the full range available), the re-start the PC.

2.6.1.4 Closing an Established Link

From an established link, use the right mouse button to select 'Disconnect Bluetooth Serial port'. In the example below, the established connection was COM port 16.



The icon will change from green to blue and the LED on the back of the tag will turn from a continuous green to a flashing red, once a second.



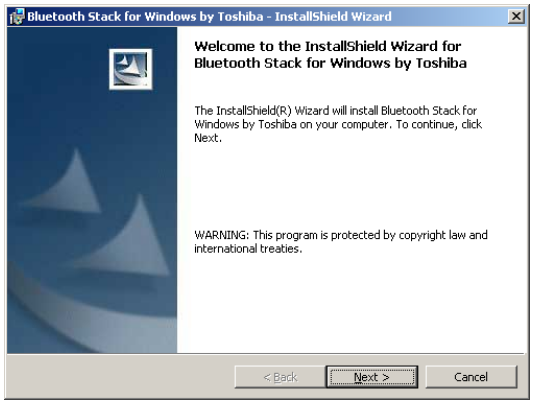
Close the Blue-soleil application.

2.6.2 Toshiba Bluetooth Stack

2.6.2.1 Installation

Insert CD and copy across the self-extracting archive file v71016T_20100628_x32.exe to the desktop, or alternatively download and run the file from the Toshiba website.

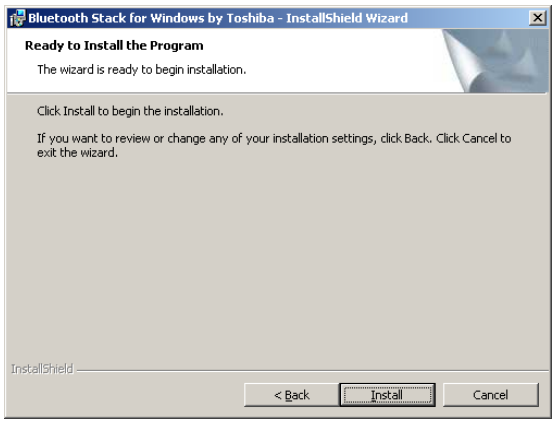
Run the file from the desktop, the following window will show:


Bluetooth Stack for Windows by Toshiba - InstallShield Wizard
Welcome to the InstallShield Wizard for Bluetooth Stack for Windows by Toshiba
The InstallShield(R) Wizard will install Bluetooth Stack for Windows by Toshiba on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
< Back
Next >
Cancel

Press ‘Next’. The following window will then show:

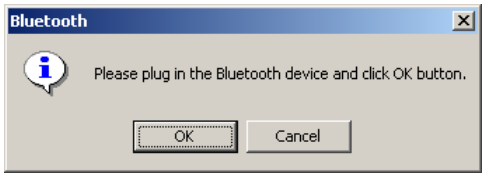
Bluetooth Stack for Windows by Toshiba - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
TOSHIBA CORPORATION
End User License Agreement
This End User License Agreement ("EULA") is a legal agreement between you and TOSHIBA CORPORATION ("TOSHIBA") with regard to the copyrighted Software provided with this EULA.
I accept the terms in the license agreement
I do not accept the terms in the license agreement
Print
InstallShield
< Back
Next >
Cancel

Select ‘I accept’ then press ‘Next’. The following window will show:

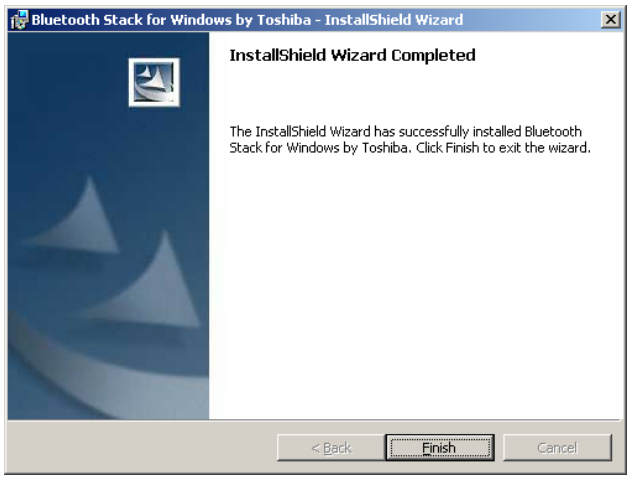

Bluetooth Stack for Windows by Toshiba - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Press ‘Install’ and wait.

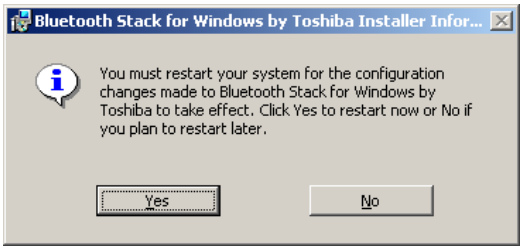
When prompted, insert the bluetooth adapter into the USB port and press ‘OK’.



Press ‘Finish’ when prompted with the following:

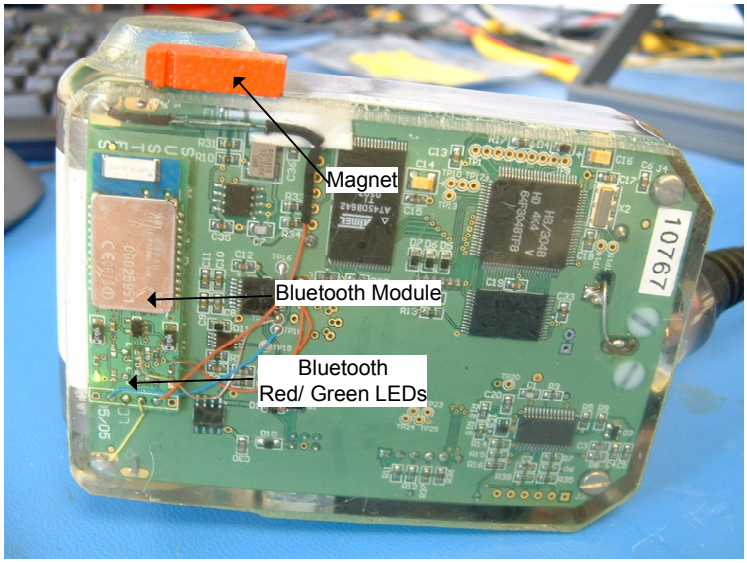

Bluetooth Stack for Windows by Toshiba - InstallShield Wizard
InstallShield Wizard Completed
The InstallShield Wizard has successfully installed Bluetooth Stack for Windows by Toshiba. Click Finish to exit the wizard.
< Back
Finish
Cancel

The PC must be rebooted before the Bluetooth adapter can be used.


Bluetooth Stack for Windows by Toshiba Installer Infor...
You must restart your system for the configuration changes made to Bluetooth Stack for Windows by Toshiba to take effect. Click Yes to restart now or No if you plan to restart later.
Yes
No

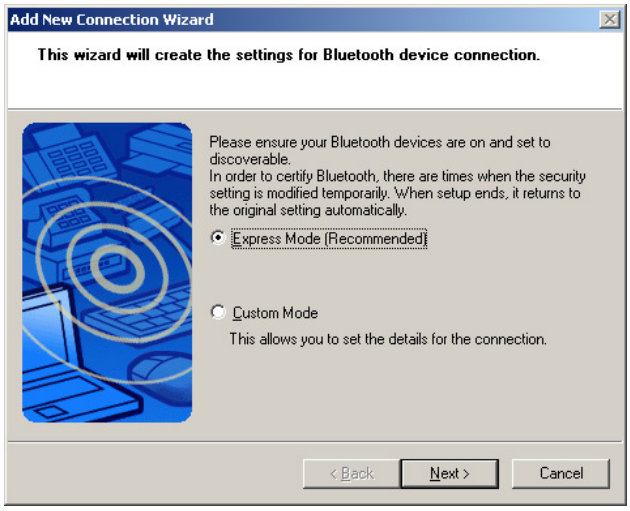
2.6.2.2 Running Bluetooth

Place a magnet against the glass reed-switch near the +ve battery terminal, **or as otherwise indicated on the tag**. A green LED on a small PCB near the back of the tag should flash periodically.

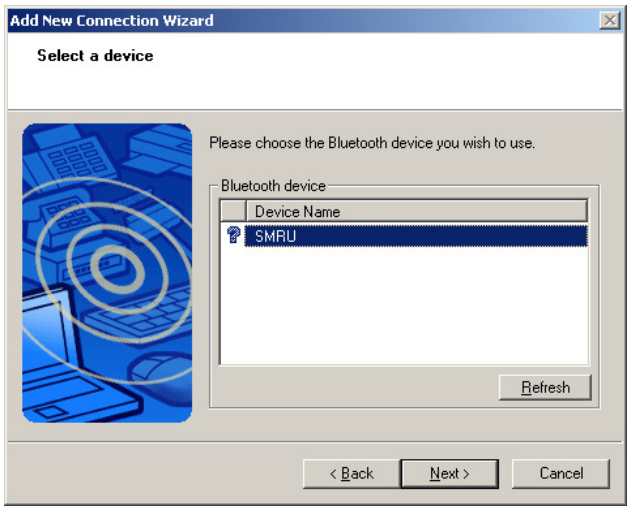


Run the bluetooth manager (icon located in start-up list in bottom right corner of the screen.

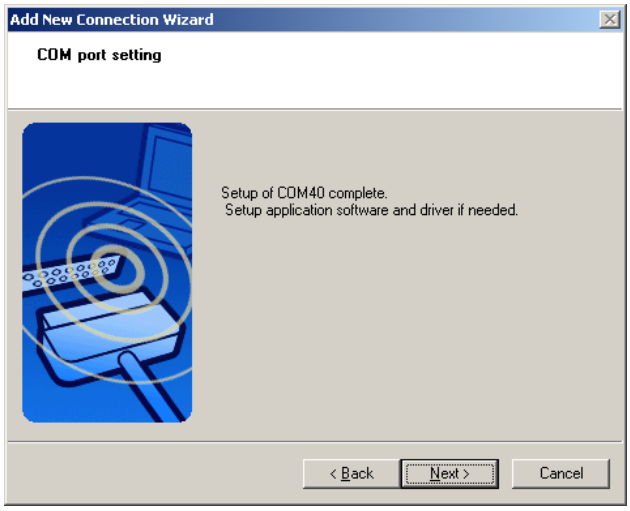
Press ‘New Connection’, the following window appears:


Add New Connection Wizard
This wizard will create the settings for Bluetooth device connection.
Please ensure your Bluetooth devices are on and set to discoverable.
In order to certify Bluetooth, there are times when the security setting is modified temporarily. When setup ends, it returns to the original setting automatically.
Express Mode (Recommended)
Custom Mode
This allows you to set the details for the connection.
< Back
Next >
Cancel

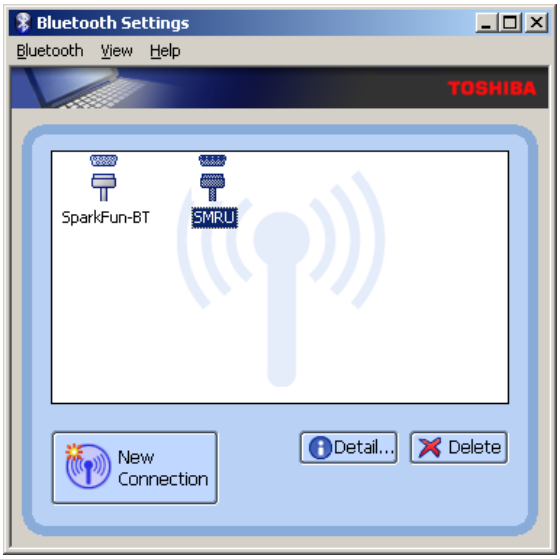
Press ’Next’, the following window appears when the bluetooth adapter is located:



Press ’Next’, the following window will appear:

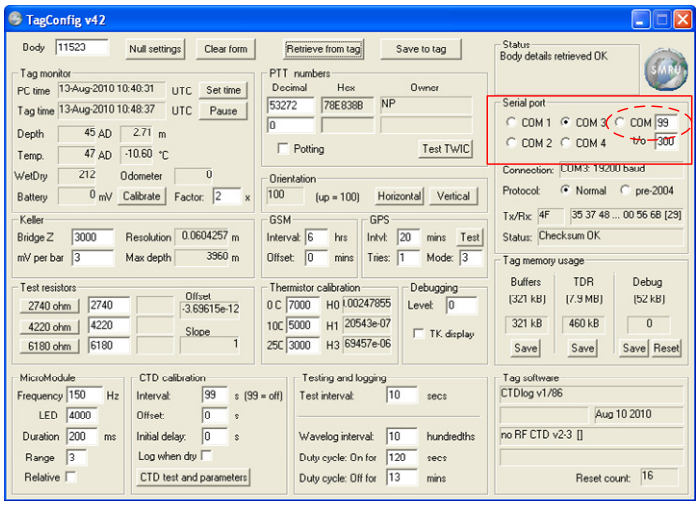


Note the number of the COM port selected (COM 40 in this case) and press 'Next'. The following window will appear:



Double click on the SMRU Icon, the window should change to the following:

Run the file TagConfig.exe, a window similar to the following window will open:

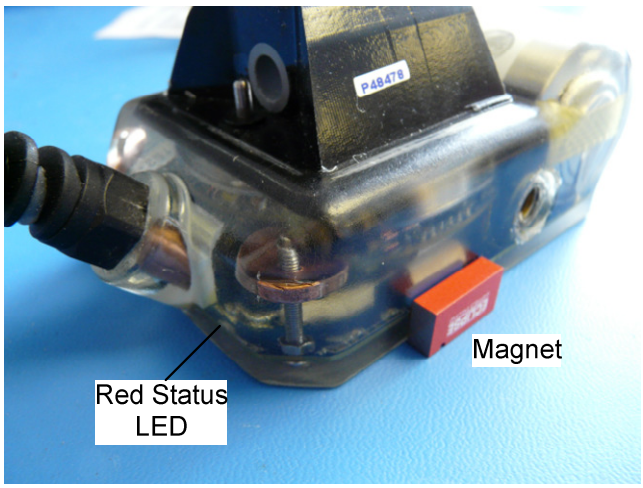


Enter the COM port from earlier, in the above example this is entered as 2. (Top-right of screen)

The TagConfig application should now be running, indicating tag time etc and the LED on the Bluetooth adapter should show a red LED rather than a flashing green one. **Note**: It may be necessary to select another com port in the TagConfig application and then re-selecting the required port in order for the TagConfig application to register the change.

2.6.2.3 Closing an Established Bluetooth Link

Remove the magnet from the Bluetooth and hold over the blue reed-switch in the position indicated.

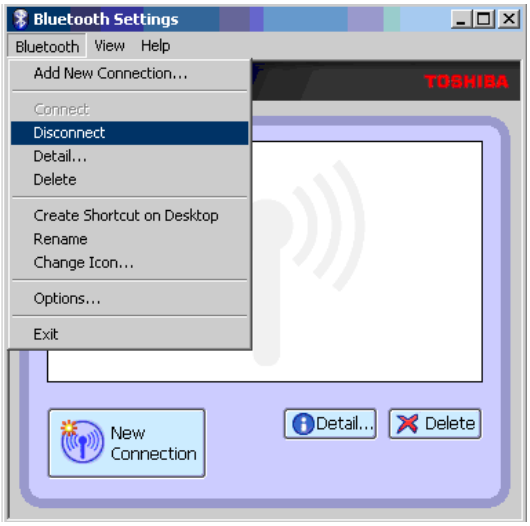


Remove magnet after 5 seconds.

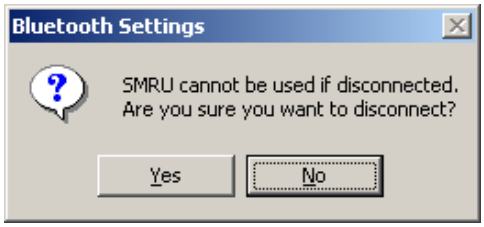
Once the magnet is removed, check the status of the “Red Status LED”. This should double flash every 10 seconds indicating that the tag is back in the reset state.

Close TagConfig application.

Disconnect the Bluetooth link as shown below:

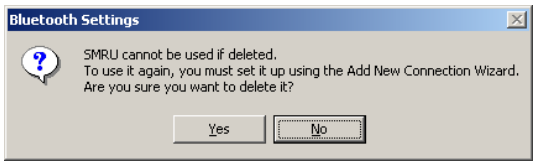


Press ‘Yes’ when prompted at the following:



Press the ‘Delete’ button to remove the link (Note: this needs to be deleted as it won’t work with the other tag – it is necessary to follow the whole of Section 2 to interface to the other tag).

When prompted with the following, press ‘Yes’.

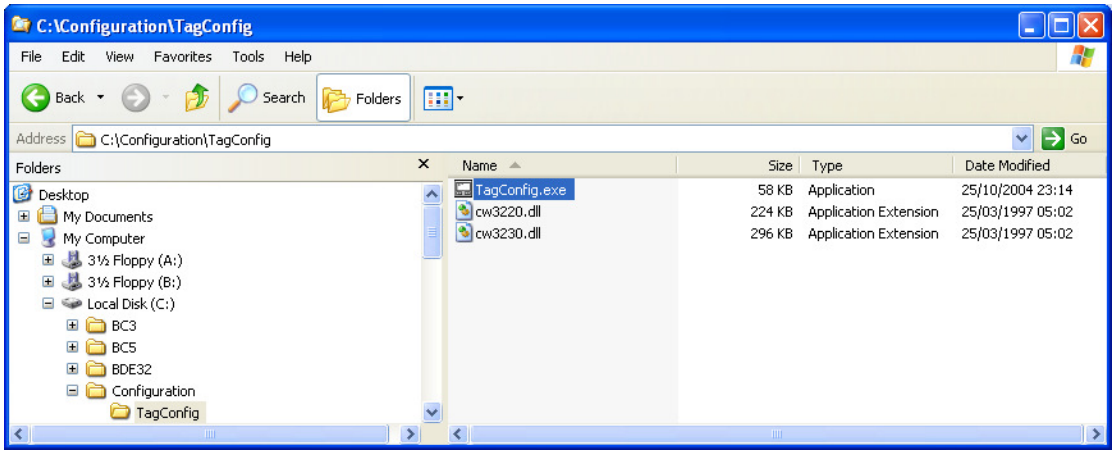

Bluetooth Settings
SMRU cannot be used if deleted.
To use it again, you must set it up using the Add New Connection Wizard.
Are you sure you want to delete it?
Yes
No

Close the application

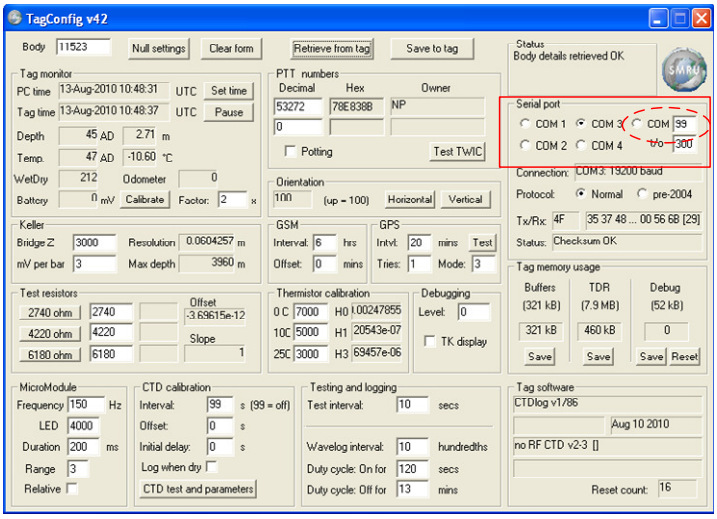
3 RUNNING TAGCONFIG

Connect the tag to the PC.

Double-click the file TagConfig.exe to run the program:

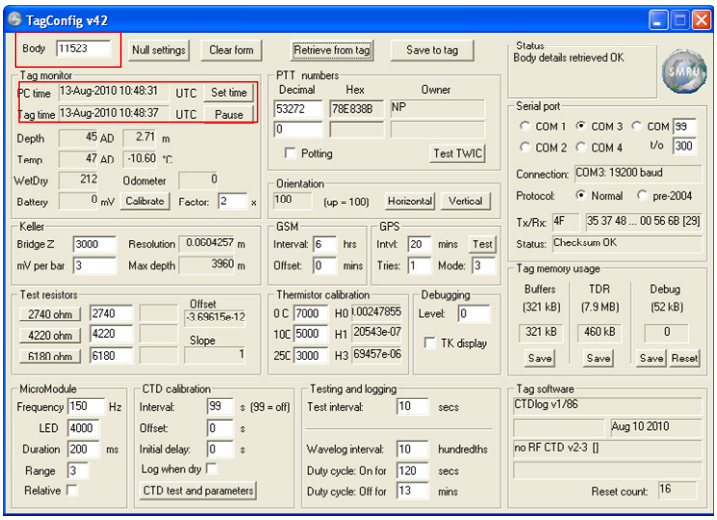


Select the appropriate COM port from the list. Com port selection is via the radio buttons located in the right corner of the screen. In the picture below COM3 is selected. If necessary you may need to select a COM port greater than 4. This is possible by manually typing the COM port number in the box shown and then selecting the corresponding radio button.



Move the toggle switch on the connector to the left (i.e. the ON position). The second red light in the connector illuminates. In addition, the yellow light near the base of the antenna in the tag changes state. This light indicates the status of the communication link between the tag and PC: it flashes once every 3 seconds when the link is inactive and a rapid sequence of double-flashes when the link is active.

The “Body” serial number and other configuration data should now appear on the screen. The “Tag time” field should begin to increment, as the TagConfig program continuously interrogates the tag. All times must be in UTC. The “Tag time” field shows ***No response*** when no tag is detected on the specified serial port.



If the body number is not displayed then it could be because the wrong com port is selected – try selecting another one (the text box adjacent to the right-most radio button allows com ports up to 99 to be selected). Alternatively it could be due to a poor electrical connection with the tag. Wiggle the connector slightly and try again, also perhaps look at the connector for excessive silicone.

3.1 Setting the Tag Time

Once the PC and tag times are updating in the 'Tag monitor' box then the tag time may be changed simply by pressing the 'Set time' button within the same box.

This synchronises the tag time with the PC – it is important before changing the tag time to ensure that the clock on the PC is synchronised to Universal Standard time.

Web Time 2000 which is freely available over the web (http://www.gregorybraun.com/WebTime.html) and may be downloaded, installed and used to configure a PC to Universal Standard Time.

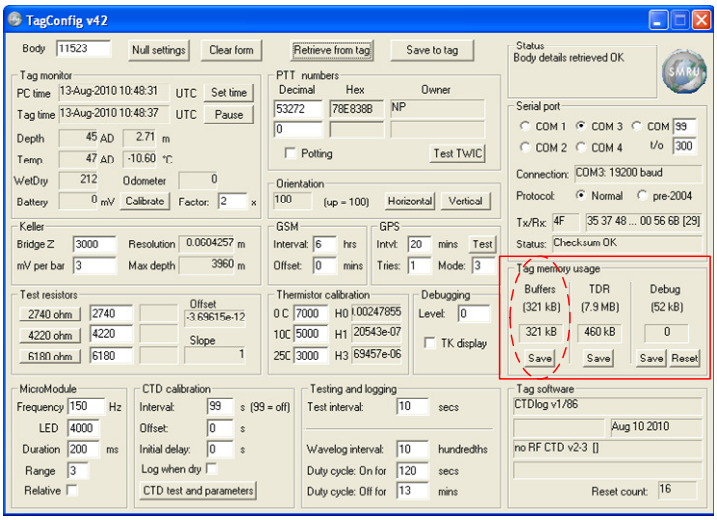
3.2 Downloading Data from a Tag

There are three types of download:

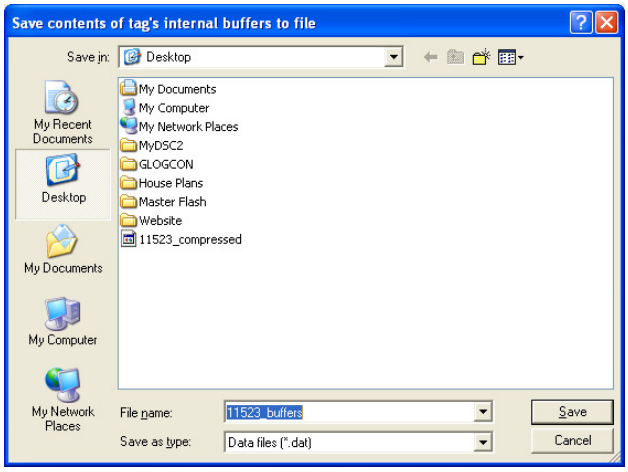
- Downloading data from a deployed tag (i.e. to download all dive history data from a tag).
- Downloading stored data in a TDR type format.
- Downloading debug data from a tag (i.e. when a tag has been used for diagnostics, e.g. GPS/GSM logging, sensor calibration etc). Under normal circumstances there is no need to download the debug data from a deployed tag.

3.2.1 Downloading Data from a Deployed Tag

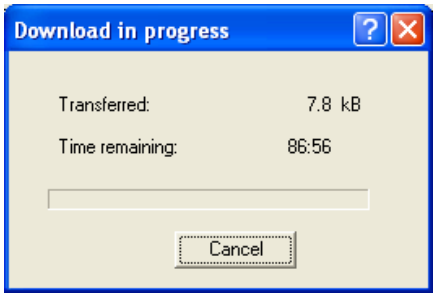
Once communication is established with the tag then the data may be downloaded by simply pressing the "Save" in buffers part of the 'Tag memory usage' box, as indicated.



Once pressed, a default filename and path is automatically specified for convenience, although this may be changed if necessary.



The status of the download will be indicated via a separate progress window. Cease download when the download file size reaches the agreed limit.

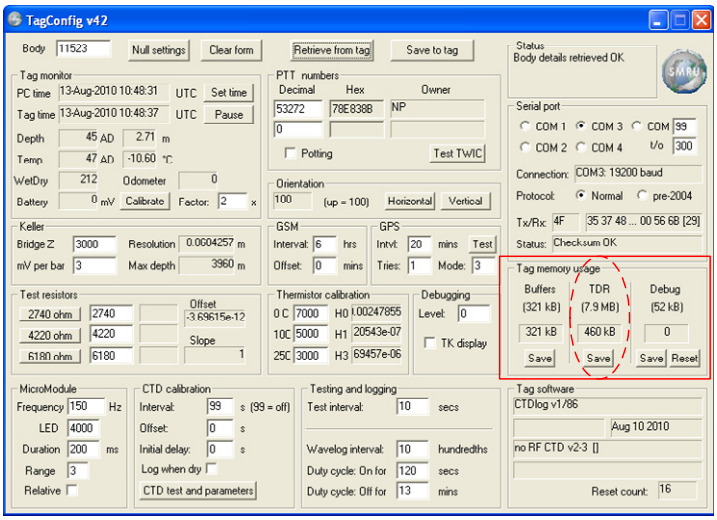


Download is ceased by pressing “Cancel”.

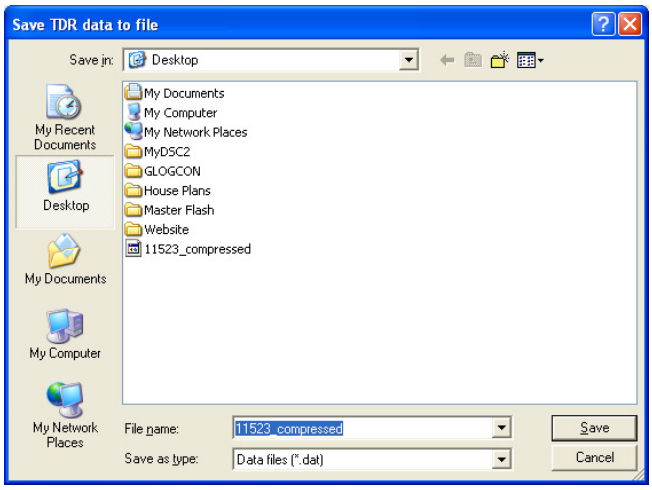
3.2.2 Downloading “TDR” Data from a Tag

Provided the function is supported by the deployment code on the tag then download of raw data in TDR type of format may be downloaded from the tag. The following details how to download this.

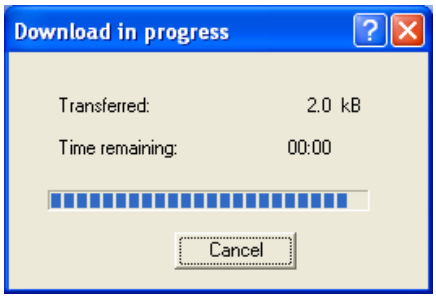
Once communication is established with the tag, press the “Save” button in the TDR part of the ‘Tag Memory usage’ box, as indicated.



Once pressed, a default filename and path is chosen for convenience. Data is decoded and formatted by the TagConfig application and presented in a readable format for subsequent use.



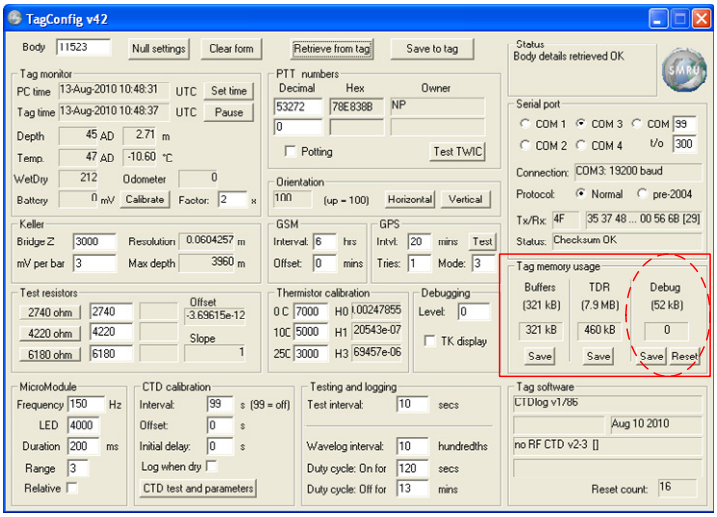
The status of the download will be indicated via a separate progress window. Download will cease automatically and be indicated in the text box as completed.



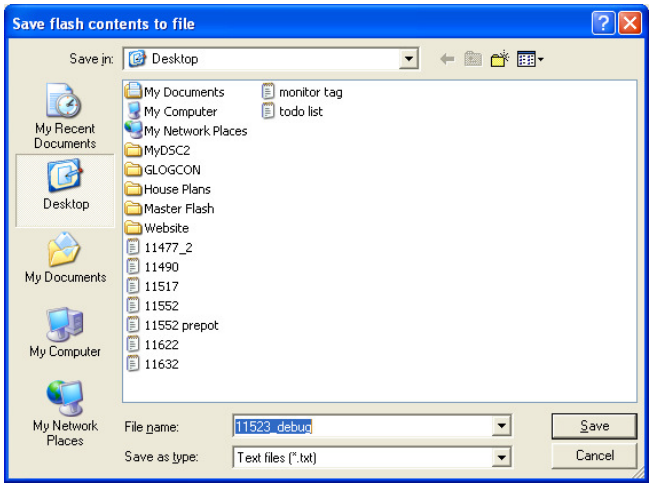
3.2.3 Downloading Debug Data from a Tag

Debug software will write data to FLASH memory. The following details how to download debug data from a tag.

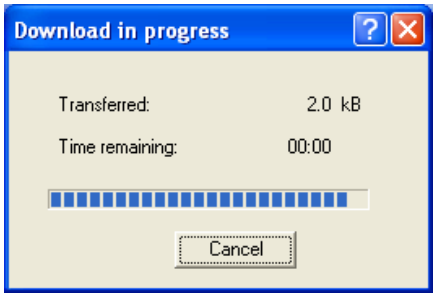
Once communication is established with the tag then the data may be downloaded by simply pressing the “Save” button in the debug part of the ‘Tag memory usage’ box, as indicted below:



As with other types of download, for convenience a default filename and type is automatically selected.



The status of the download will be indicated via a separate progress window. Download will cease automatically and be indicated in the text box as completed.

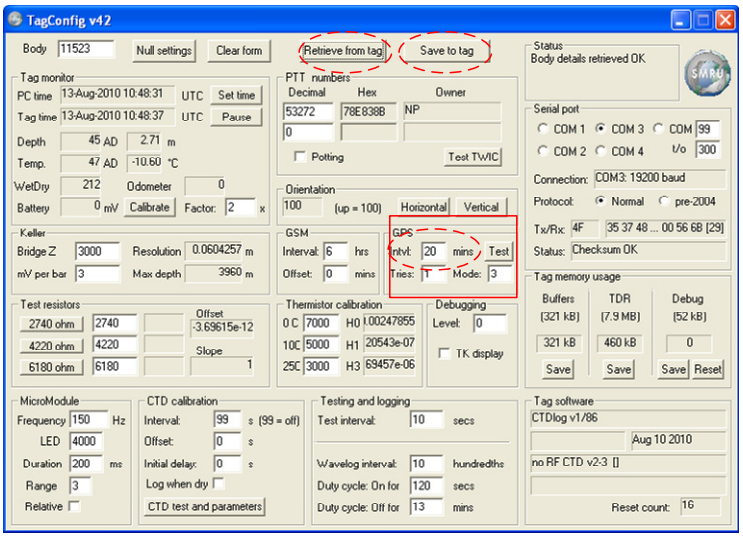


Once downloaded, the data may be erased from FLASH memory by pressing the “Reset” button corresponding to the “Save” button just pressed.

3.2.4 Setting GPS Sample Rate

The following details how to set the GPS sample-rate:

With the tag connected to a PC and TagConfig running, move the PC's mouse over the GPS text box indicated below and press the mouse. Use the keyboard to edit the value to the required value. The value indicated in the picture below is 20 minutes (the default value).

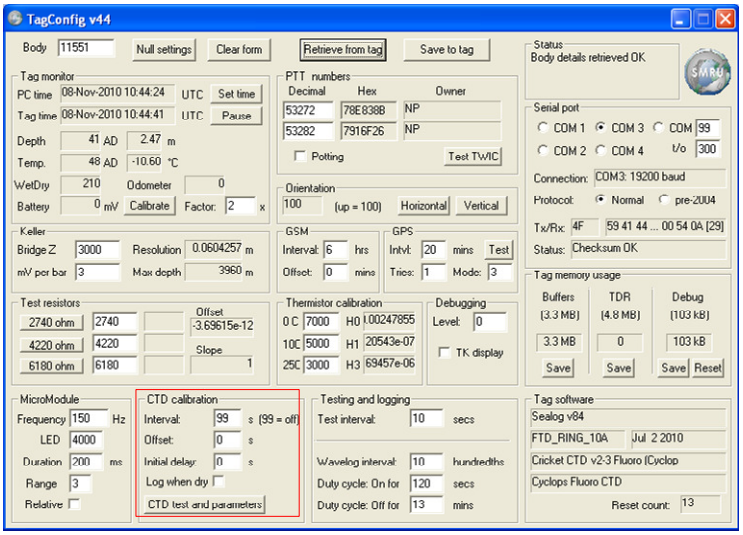


Once the correct value has been entered, press the save to tag button, then the 'Retrieve from Tag' button. Once again check the value in the GPS text box is still the correct value required.

3.2.5 Configuring CTD for Test Mode

It is possible to configure the tag to manually log the data from the CTD (and other oceanographic sensors) to the on-board flash memory.

The parameters which control the measurements must be pre-set using TagConfig. All reside within the CTD calibration window and are as follows:



Interval - sets the frequency of measurement (in seconds) and takes the range from 1-59. Numbers in excess of 59 switch off the logging mode.

Offset - sets the delay (in seconds) from successive measurements (see examples below)

Initial Delay - sets the delay (in seconds) from the initial activation of the tag.

Log when Dry - when this is checked, the tag will continue to take measurements after the tag has been removed from the water. Note, regardless of whether this is checked, the tag still needs to be activated to start the software. Be aware of this function, there is a danger that the tag may be left in this mode following tests in which case the battery would drain…

e.g. 1) Interval = 5, Initial delay = 0, Offset = 0, if activated at time = 0, samples at 0, 5, 10, 15…

e.g. 2) Interval = 5, Initial delay = 20, Offset = 0, if activated at time = 0, samples at 20, 25, 30, 35…

e.g. 3) Interval = 5, Initial delay = 0, Offset = 3, if activated at time = 0, samples at 3, 6, 9, 12…

The reason for using offset would typically be to prevent CTDs in relatively close proximity from sampling at the same time where cross-coupling of magnetic fields may be an issue.

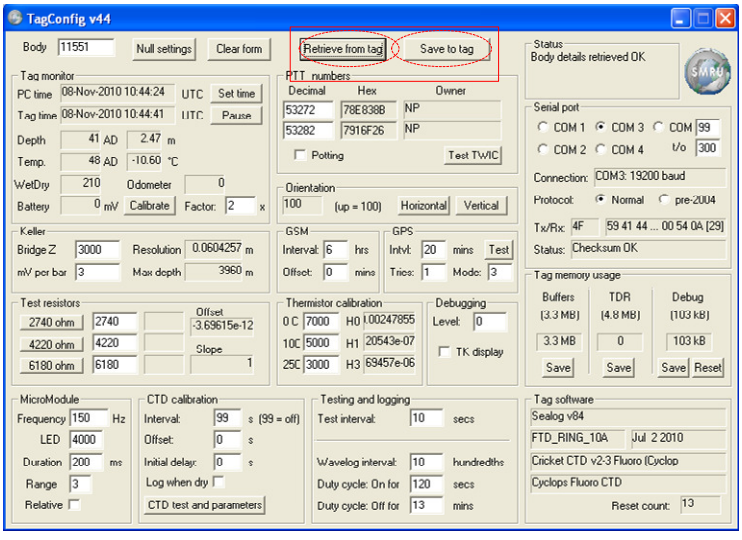
To set the tag in logging mode:

Prepare the tag and plug in to a computer using the test lead provided (r.e. Sections 2.1 & 2.2).

Use the TagConfig application to view the various tag parameters (Sections 2.3, 2.4, 2.5 & 3)

Use the PC to set the four parameters detailed above.

Save the parameter to the tag by pressing the “Save to Tag” button, as shown below.



Press the “Retrieve from Tag” button to ensure tag parameters are set.

Remember, if using the Log when dry feature, the tag must be either reset with a magnet (as described in Section 6.1.1), or plugged in to TagConfig the check-box un-ticked and then ‘saved to tag’. Always re-confirm with a ‘Retrieve from tag’ operation. Never deploy a tag with the log when dry feature ticked.

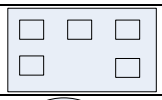
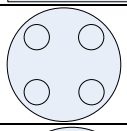
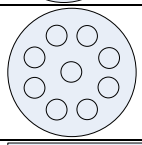
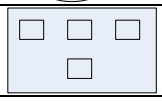
The data may be downloaded from the tag from the ‘Debug’ part of the flash memory – note, the size of this part of the flash is capped at 100kB, equating to a maximum of nominally 1000 samples before the flash is filled.

Refer to Section 3.2.3 for downloading the data from the flash memory.

4 PROGRAMMING A TAG

Before a tag can be programmed it is important to distinguish between a tag fitted with an old Hitachi processor and one with a new Hitachi processor.

The following table details the various recent tag combinations:

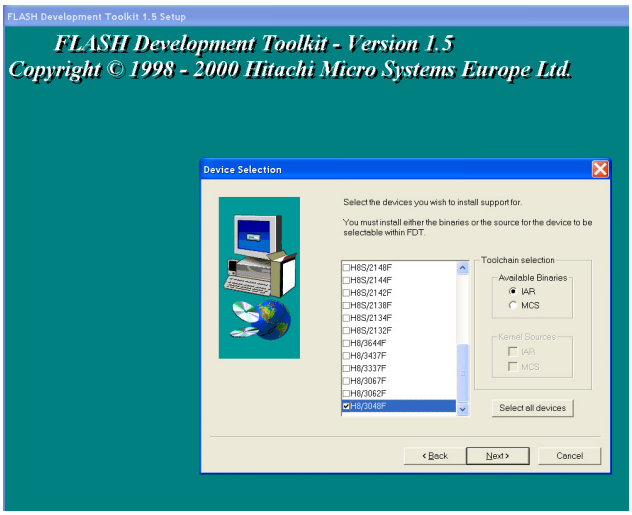
Square 5-pin connector in ‘’ configuration, green main PCB		Old Hitachi Processor
Round 4-pin connector, green main PCB		Old Hitachi Processor
Round 9-pin connector, blue PCB		New Hitachi Processor
Square 4-pin connector in ‘’ configuration		New Hitachi Processor

4.1 Old Hitachi Processor

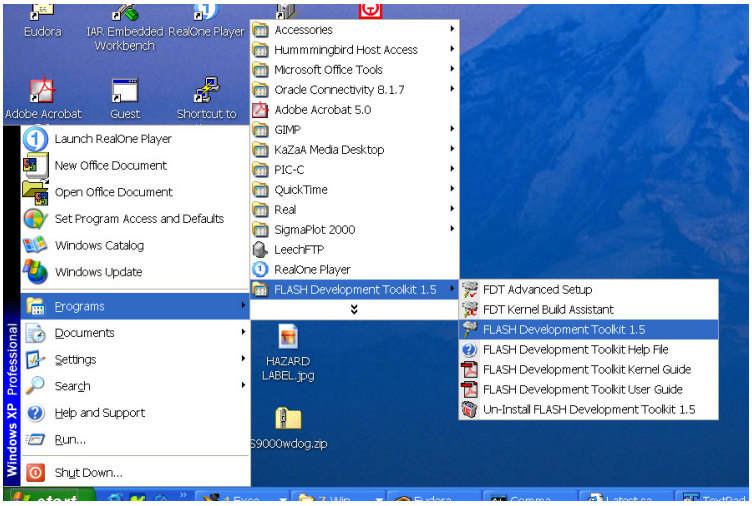
4.1.1 Installing Programming Software

Run the program **fdt15.exe** to install the programming software**.**

Accept all the default settings up to the following screen. Choose “H8/3048F” as shown here:



Accept all the remaining defaults to complete the installation. The program should now appear on the Start menu:

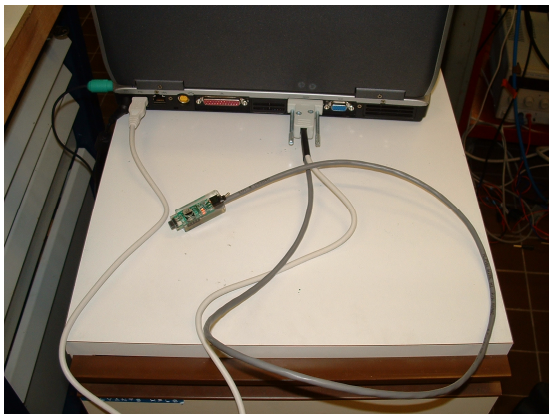


4.1.2 Programing the SRDL

For the old-style programming cable:

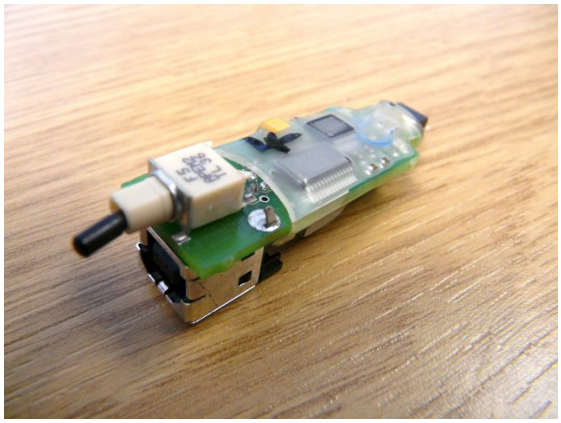
Connect the programming cable to a spare USB port on the computer.

Plug the 9-pin ‘D’ type connector on the programming cable into a serial port (COM1 or COM2) on the computer.



For the new-style connector:

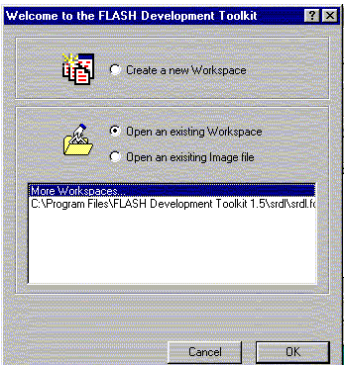
Connect the programming cable to a spare USB port on the computer using a standard USB a/b cable. **Note**: for this connector it may be necessary to first configure the USB port on the PC. Refer to Section 3.3.



Make sure switch **B** is in the off position (i.e. the light is off)

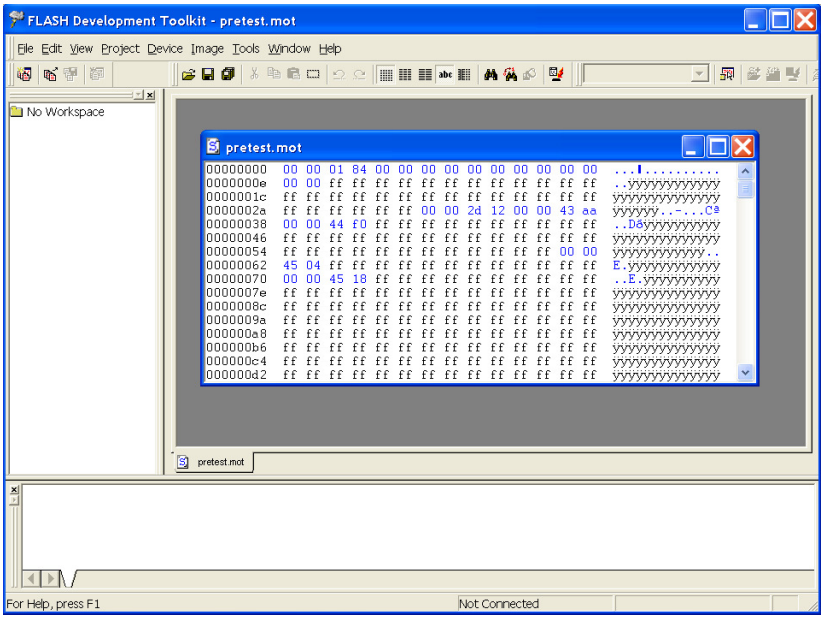
Run “Flash Development Toolkit 1.5” program on your computer

Press **Cancel** at the “Welcome” screen :

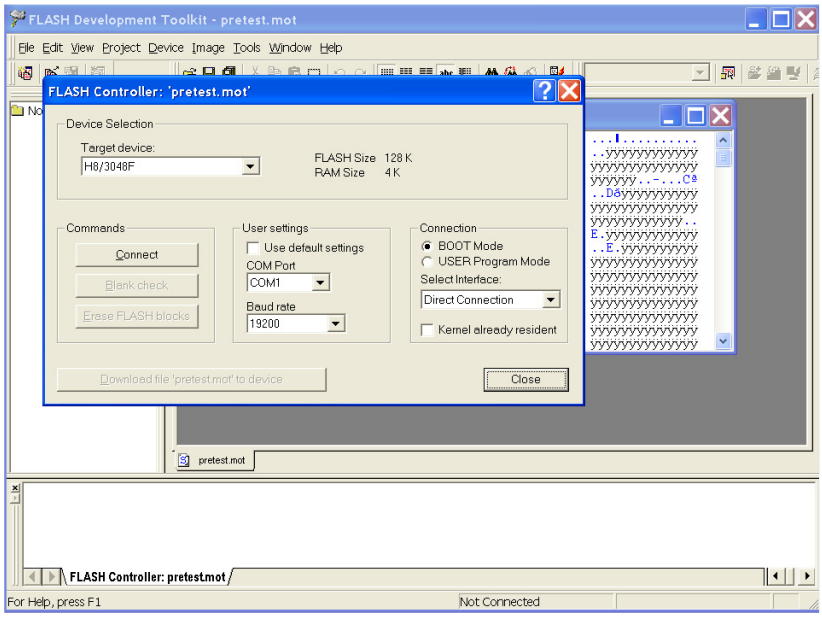


Maximise the program window

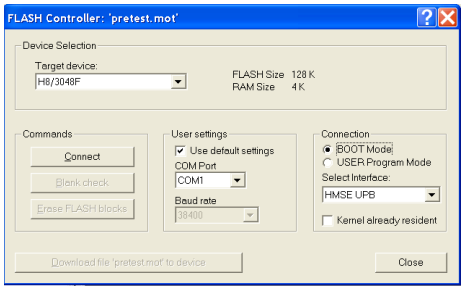
Click the Open File icon on the toolbar, navigate to where the new SRDL code file is stored, then select it. A Code window should appear in a new section of the program’s screen (the name **pretest.mot** shown in this example should be replaced by the appropriate code file name, e.g. **MACQ_04B.a37**). The file extensions **.mot** and **.a37** are interchangeable – the program recognises both:



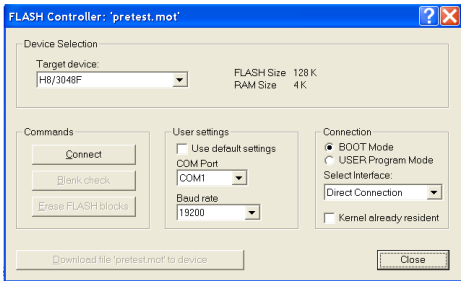
Click the button to open the download dialog:



The default settings must be changed the first time this program is run.



Original settings



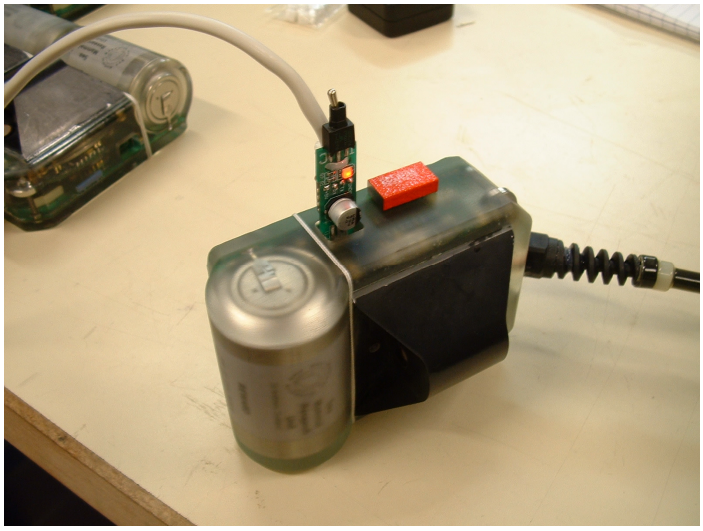
Correct settings

Clear “Use default settings”

Change “Baud rate” to 19200

Change “Select Interface” to Direct Connection

Change **“COM Port”** if you chose a different serial port



Connect the plug **B** to the socket (making sure its light is off)

Place a magnet above the blue oblong reed switch

Move switch on **B** to the ON position (its light should come on)

CHECKPOINT – The **SRDL’s** yellow LED (near the base of the antenna) should also flicker continuously

Click “**Connect**”. The blue progress bar moves to 99% then pauses before completing. If bar stops at 10% there is a problem with the serial connection, or another program is using the serial port.

Click “Download file *xxxx*.a37 to device”

When downloading is complete, answer “**Yes**” when asked “**Perform read-back verification?**”

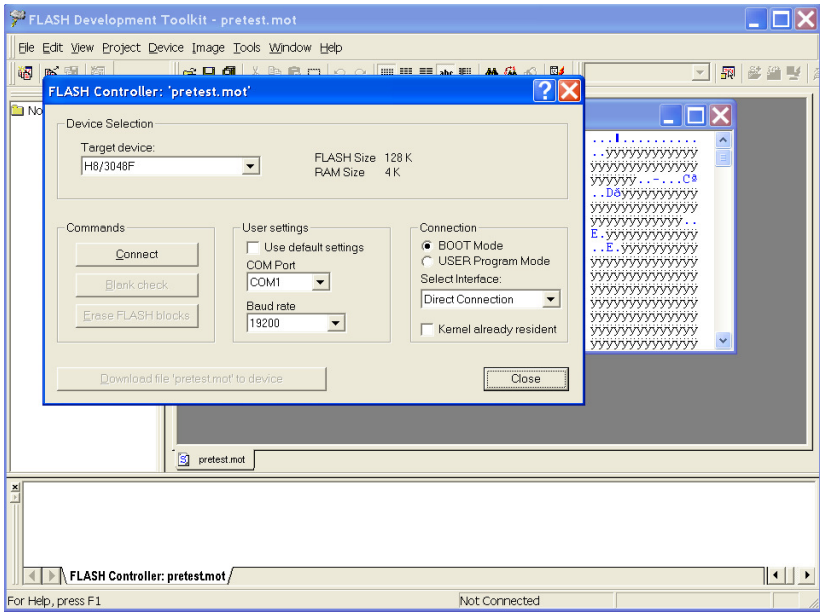
CHECKPOINT – message in green confirms successful download of program to the SRDL:

Move switch on **B** to OFF position

Remove magnet to start the new program

CHECKPOINT – red LED flashes every 10 seconds. SRDL is now in standby mode.

For subsequent SRDL’s, click the “Close” button on the dialog box, and repeat the process above, i.e.:



connect a new SRDL

place magnet over blue block

switch on **B**

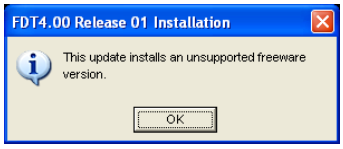
click the icon, then repeat the downloading procedure outlined above.

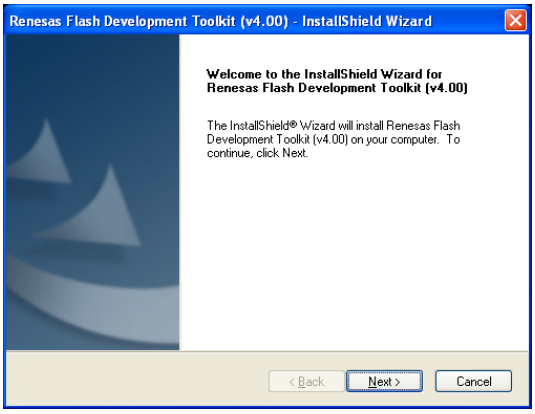
4.2 New Hitachi Processor

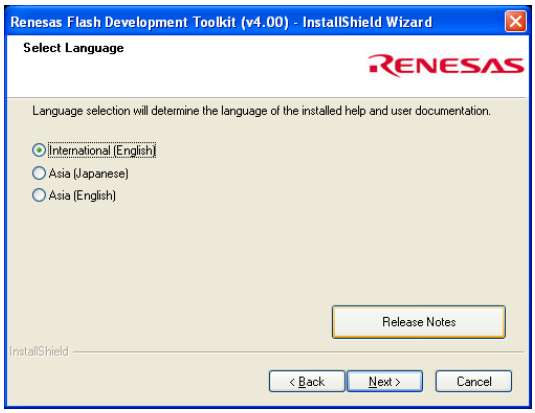
4.2.1 Installing Renesas Software v4.00

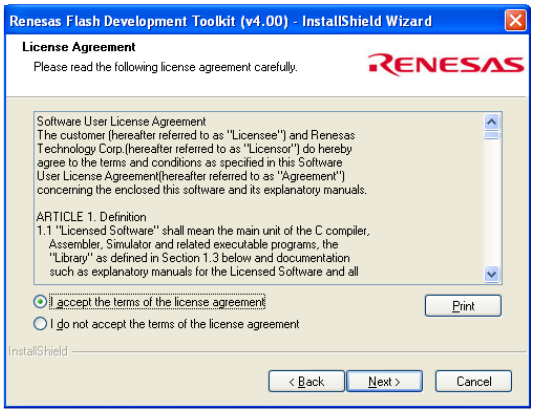
Copy the installation file on to the PC desktop and run the installer by using the mouse to double click on the icon.

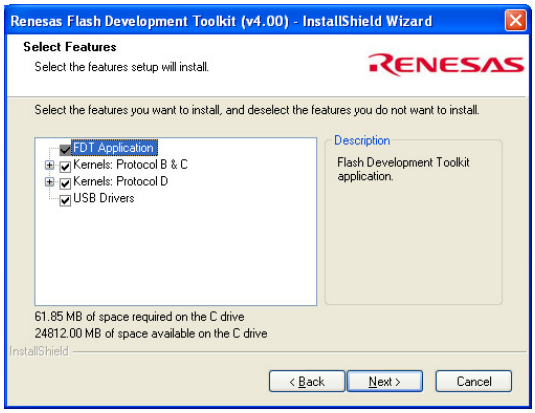
Navigate through the various installation windows, ensuring the correct ‘radio buttons’ are checked for each window before pressing either ‘next’ or ‘ok’:

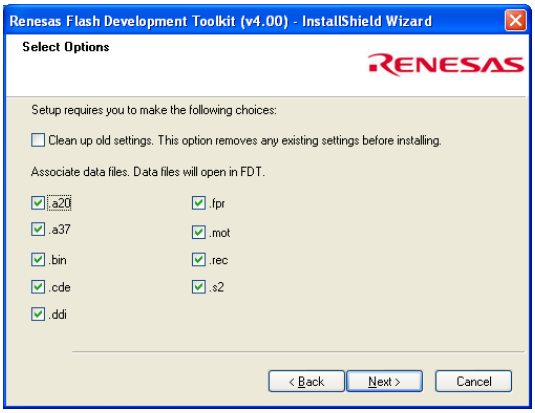

FDT4.00 Release 01 Installation
This update installs an unsupported freeware version.
OK

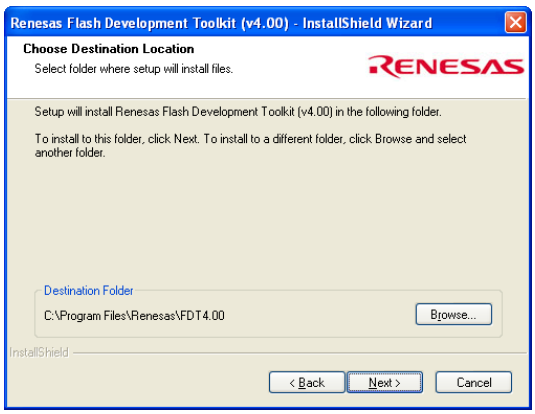

Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Welcome to the InstallShield Wizard for Renesas Flash Development Toolkit (v4.00)
The InstallShield® Wizard will install Renesas Flash Development Toolkit (v4.00) on your computer. To continue, click Next.
< Back
Next >
Cancel

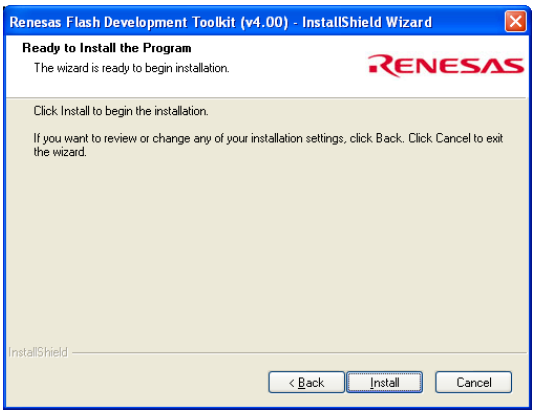

Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Select Language
RENESAS
Language selection will determine the language of the installed help and user documentation.
International (English)
Asia (Japanese)
Asia (English)
Release Notes
InstallShield
< Back
Next >
Cancel

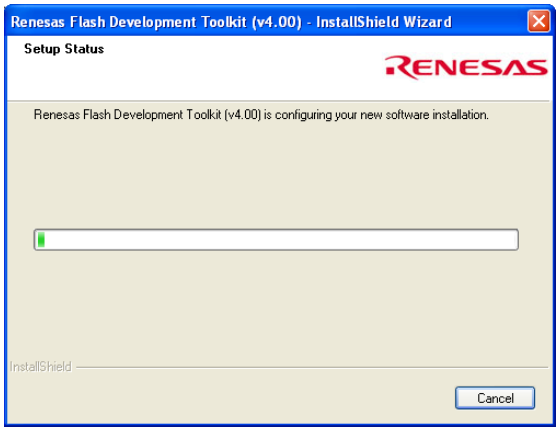

Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
RENESAS
Software User License Agreement
The customer (hereafter referred to as "Licensee") and Renesas Technology Corp.(hereafter referred to as "Licensor") do hereby agree to the terms and conditions as specified in this Software User License Agreement(hereafter referred to as "Agreement") concerning the enclosed this software and its explanatory manuals.
ARTICLE 1. Definition
1.1 "Licensed Software" shall mean the main unit of the C compiler, Assembler, Simulator and related executable programs, the "Library" as defined in Section 1.3 below and documentation such as explanatory manuals for the Licensed Software and all
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

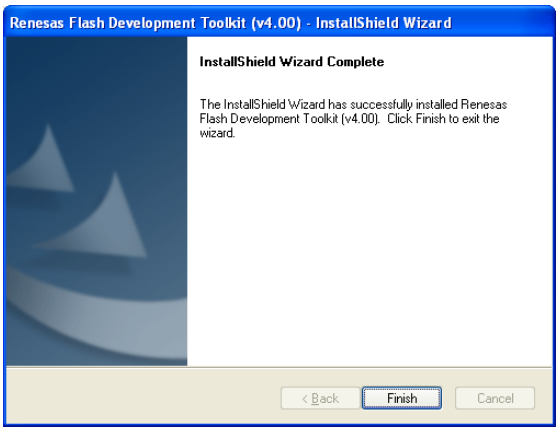

Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Select Features
Select the features setup will install.
RENESAS
Select the features you want to install, and deselect the features you do not want to install.
FDT Application
Kernels: Protocol B & C
Kernels: Protocol D
USB Drivers
Description
Flash Development Toolkit application.
61.85 MB of space required on the C drive
24812.00 MB of space available on the C drive
InstallShield
< Back
Next >
Cancel


Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Select Options
RENESAS
Setup requires you to make the following choices:
Clean up old settings. This option removes any existing settings before installing.
Associate data files. Data files will open in FDT.
.a20
.a37
.bin
.cde
.ddi
.fpr
.mot
.rec
.s2
< Back
Next >
Cancel


Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
RENESAS
Setup will install Renesas Flash Development Toolkit (v4.00) in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Renesas\FDT4.00
Browse...
InstallShield
< Back
Next >
Cancel


Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
RENESAS
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel


Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
Setup Status
RENESAS
Renesas Flash Development Toolkit (v4.00) is configuring your new software installation.
InstallShield
Cancel

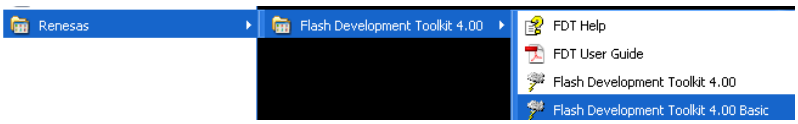

Renesas Flash Development Toolkit (v4.00) - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Renesas Flash Development Toolkit (v4.00). Click Finish to exit the wizard.
< Back
Finish
Cancel

4.2.2 Configuring the Renesas fdt v4.00 Software

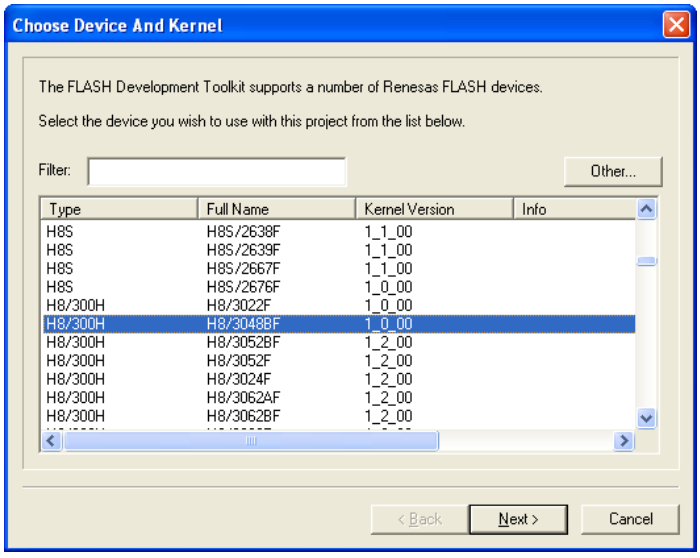
The following section details how to configure the Renesas software for programming a tag.

This process only needs to be complete once for a given software installation on a PC. The configuration values are preserved for next time the software is run.

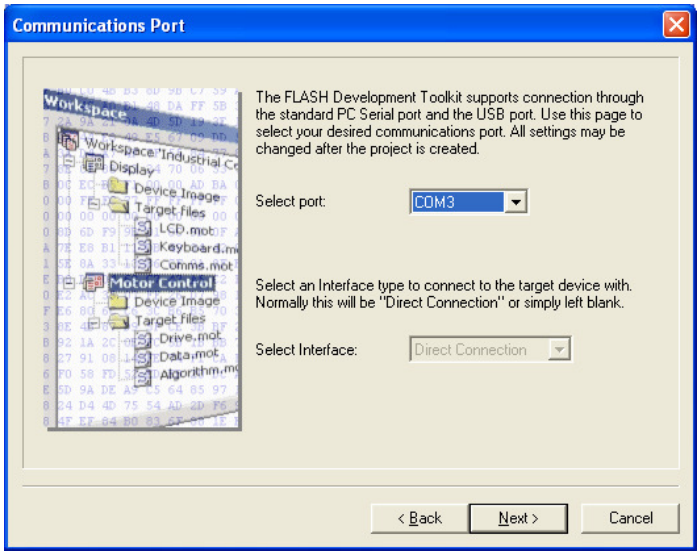
Start the ‘Flash Development Toolkit’ application from the start menu on the PC.



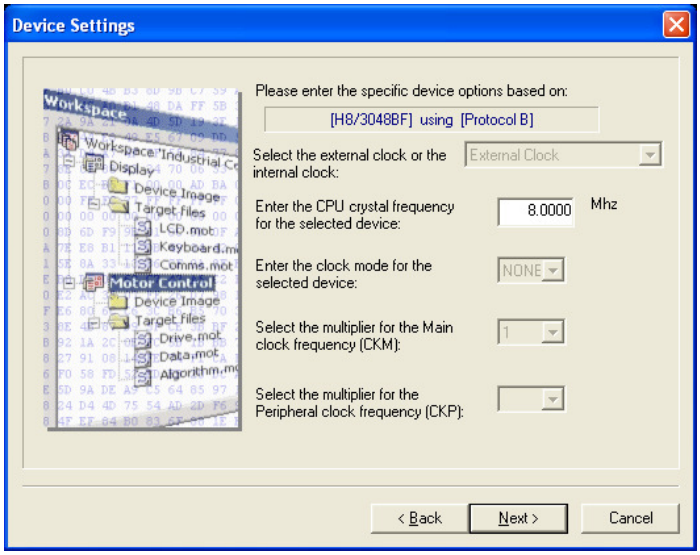
Scroll down the list and select the processor ‘H8/3048BF’



Using the drop-down menu, select the COM port used by the programming cable, then press ‘next’. Note: I have experienced some problems with higher COM port numbers, better to use COM ports 1-4.

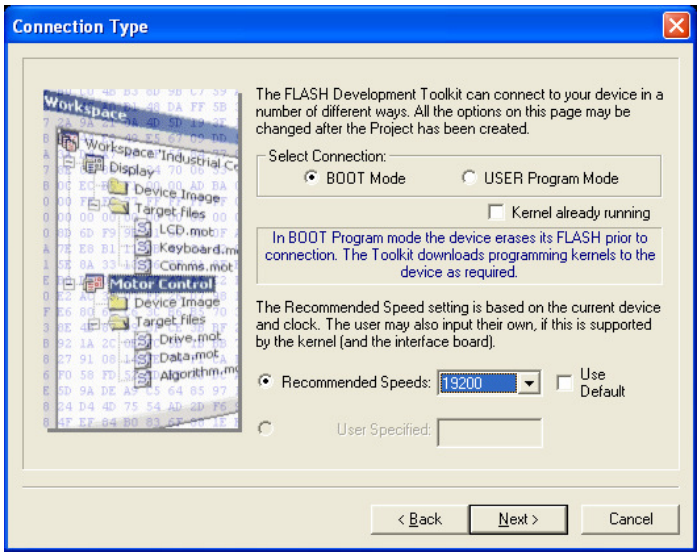

Communications Port
The FLASH Development Toolkit supports connection through the standard PC Serial port and the USB port. Use this page to select your desired communications port. All settings may be changed after the project is created.
Select port:
COM3
Select an Interface type to connect to the target device with. Normally this will be "Direct Connection" or simply left blank.
Select Interface:
Direct Connection
< Back
Next >
Cancel

Set the clock frequency to 8.00MHz, then press ‘next’

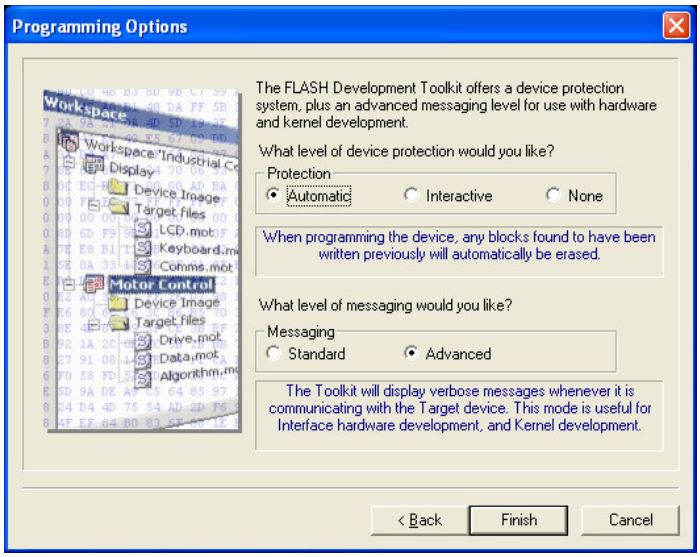

Device Settings
Please enter the specific device options based on:
[H8/3048BF] using [Protocol B]
Select the external clock or the internal clock:
External Clock
Enter the CPU crystal frequency for the selected device:
8.0000
Mhz
Enter the clock mode for the selected device:
NONE
Select the multiplier for the Main clock frequency (CKM):
1
Select the multiplier for the Peripheral clock frequency (CKP):
< Back
Next >
Cancel

Set the connection type to ‘Boot Mode’. Deselect the ‘Use Default’ and set the recommended speed to 19200 from the drop-down list. Press ‘next’

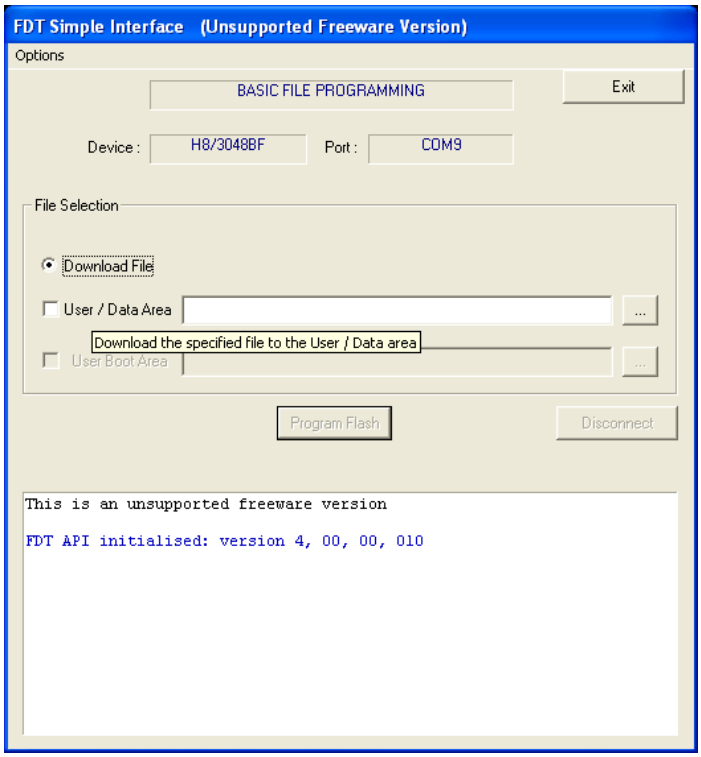
NOTE: If Bluetooth is to be used to program the tags (as opposed to using a programming cable) then the default rate must be set to 9600 and not 19200.


Connection Type
The FLASH Development Toolkit can connect to your device in a number of different ways. All the options on this page may be changed after the Project has been created.
Select Connection:
BOOT Mode
USER Program Mode
Kernel already running
In BOOT Program mode the device erases its FLASH prior to connection. The Toolkit downloads programming kernels to the device as required.
The Recommended Speed setting is based on the current device and clock. The user may also input their own, if this is supported by the kernel (and the interface board).
Recommended Speeds:
19200
Use Default
User Specified:
< Back
Next >
Cancel

Set the Programming Options to ‘Protection – Automatic’ and ‘Messaging – Advanced’. Press ‘Finish’.

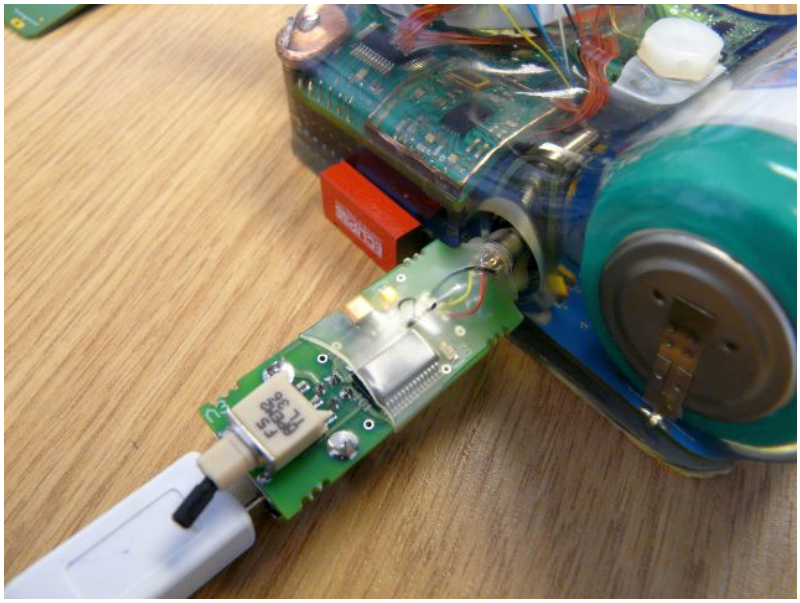

Programming Options
The FLASH Development Toolkit offers a device protection system, plus an advanced messaging level for use with hardware and kernel development.
What level of device protection would you like?
Protection
Automatic
Interactive
None
When programming the device, any blocks found to have been written previously will automatically be erased.
What level of messaging would you like?
Messaging
Standard
Advanced
The Toolkit will display verbose messages whenever it is communicating with the Target device. This mode is useful for Interface hardware development, and Kernel development.
< Back
Finish
Cancel

When the ‘Finish’ button is pressed, the main window used for programming a tag opens automatically.



4.2.3 Tag Programming with Renesas fdt v4.00 Basic Software

If the Renesas software is being used for the first time then follow the configuration instructions in the preceding section, else as follows:



Connect the USB adapter to the tag – Note this connector is keyed (the switch should be uppermost and in the position indicated in the photograph above).

Connect the USB adapter to the USB port of a PC using the cable provided.

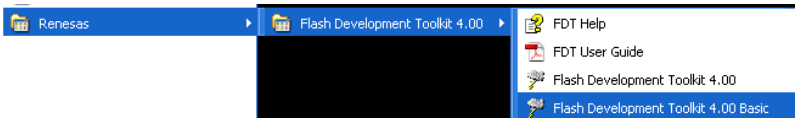
Determine the USB port (see section on Configuring the USB Port of necessary).

Place a magnet against the blue reed-switch

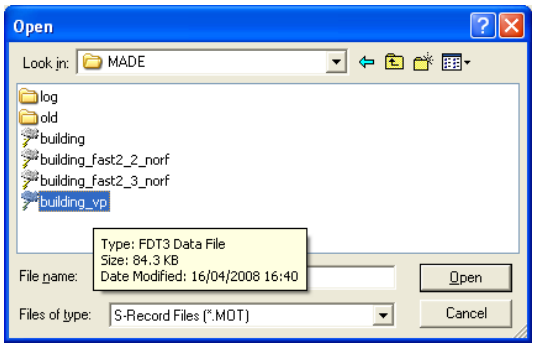
If Programming by Bluetooth (as opposed to with a programming cable), place a second magnet against the bluetooth reed switch. When in the correct position, the reedswitch LED will periodically flash RED. Refer to Section 2.6.1.2.

Note: If programming by Bluetooth, the order in which the two magnets is positioned against the tag is important. The magnet for the blue reed-switch **must** be positioned first, **then** the Bluetooth reed-switch.

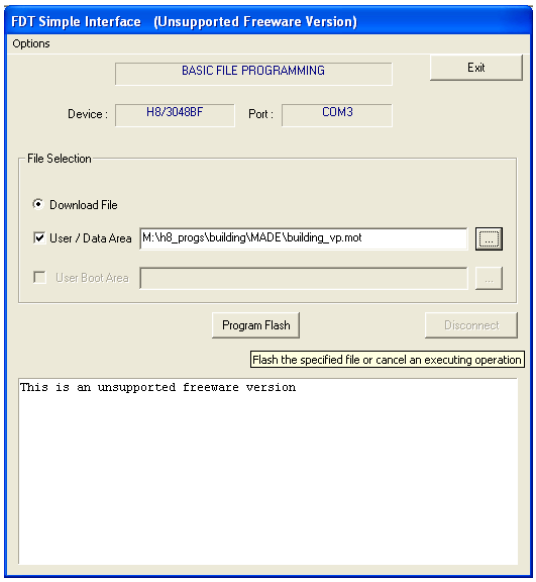
Run the 'flash development toolkit v 4.00 Basic' from the 'Start menu



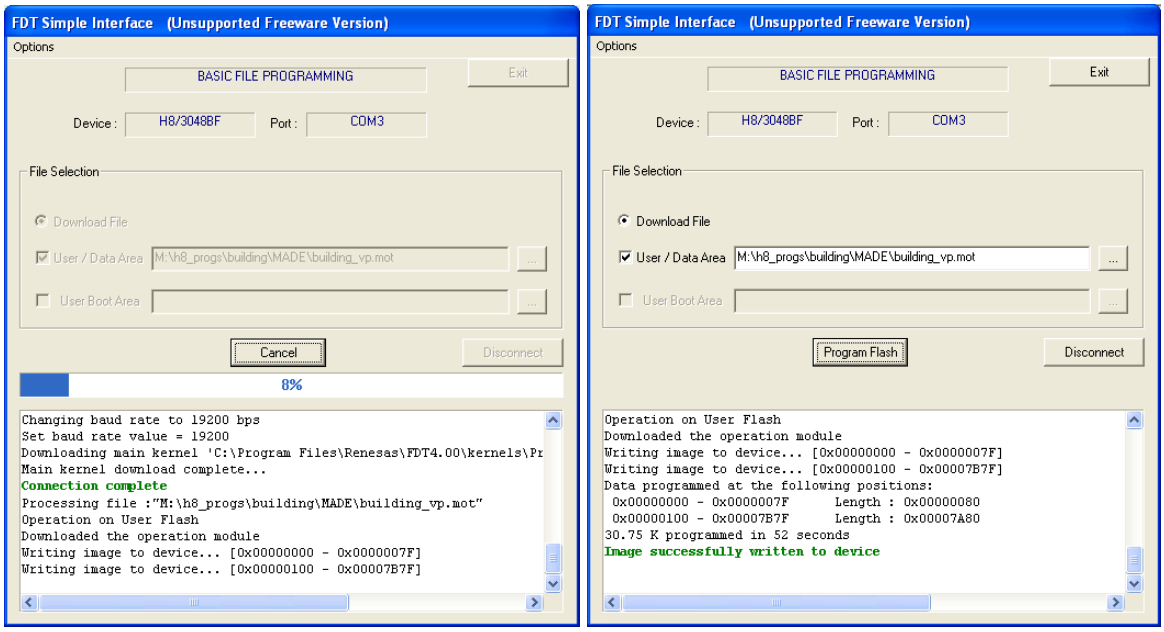
Navigate to the file to load on to the tag



When the file has loaded in to the application, switch the switch on the programming connector – both the yellow and red LEDs on the programming connector should illuminate. Press the 'Program Flash' button.



Progress is reported in a status window, as follows:



When programming has completed successfully, press the ‘Disconnect’ button then close the application.

It may be necessary to re-configure the setting for the Renesas software, such as if a different programming adapter is used, or a different COM port needs to be selected.. This may be achieved by selecting the ‘Options’ tab in the main window. The windows then takes the same format as that detailed in the ‘Configuring the Renesas Software’ section earlier.

5 RE-SEALING A TAG

The programming socket needs to be protected before the tag can be deployed. This is simply the reverse procedure of Section 2.1.

Switch off the programming lead, if connected, by moving the toggle switch towards the back of the tag such that the red light turns off. Then remove the programming lead.

Remove excess silicon using a scalpel blade from both the programming socket recess and the protective plug.

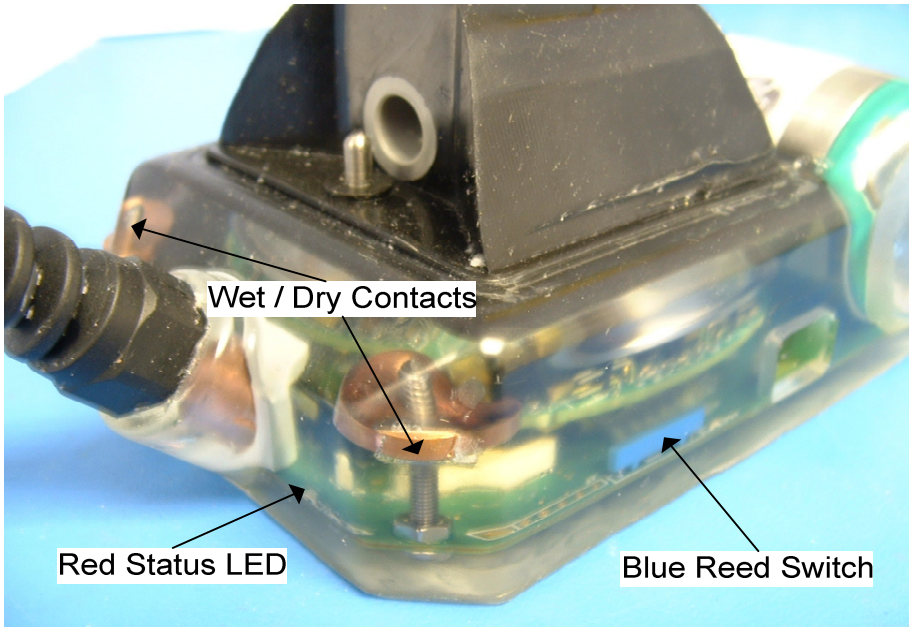
Insert the protective plug in to the tag.

Back-fill the void with silicon rubber – most soft silicon compounds commonly used in a bathroom to seal around a bath etc will suffice. Allow to fully cure (generally 24 hrs) before handling. A helpful tip is is to smooth over the surface afterwards using a bit of soap to get a good finish.

6 ACTIVATING A TAG

All tags are shipped in sleep mode. In this state the tags can be left for many months with only minimal power drain from the battery. The photograph below show the location of the red status LED, between the base of the antenna and the left-hand contact when viewed from the battery end. In sleep mode the red status LED flashes a double flash once every 10 seconds:

The example shown below is for a CTD tag but other tags are generically identical.



6.1 Tag Activation and Functionality

The tag activates automatically when it detects immersion in sea-water.

Upon immersion in sea-water, the red status LED changes from a double red flash every 10 seconds to a more rapid series of triple flashes. If the tag remains immersed for a few seconds the pattern changes to a single flash every 4 seconds. This signifies that the deployment software is operating and temperature, depth and conductivity measurements are being taken under software control.

Upon removal from sea-water, this single flash continues as ARGOS or GSM transmissions commence. These will continue for approximately 24 hours, but will then reduce in frequency to preserve battery life. In this condition the tag is in 'haul-out' mode. The tag will remain in this mode until re-immersed in sea-water.

The tag can be returned to sleep mode by holding a magnet against the blue reed switch (refer to photograph above) for 10 seconds. Upon removal of the magnet the red status LED will perform double flashes every 10 seconds.

6.1.1 Tag Testing

Please perform the following tag test prior to deployment:

Check that the tag is in sleep mode: i.e. the red status LED is flashing double pulses every 10 seconds.

For Argos based tags only:

Place the 'chirper' such that its antenna is parallel to and touching the tag's antenna. Hold the magnet against the blue reed switch for a few seconds, then remove it. The 'chirper' should detect the first test transmission by emitting a short beep.

Activate the tag by shorting the two wet / dry contacts using a piece of wire. Almost any wire is suitable for this. Keep these contacts shorted until the red status LED goes through a sequence of 6 triple flashes and changes to a single flash approximately every 4 seconds.

Remove the shorting wire and position the tag in a position with good visibility of the sky and leave for several hours (min 6 hrs). If more than one tag is being tested at any one time then the tags should ideally be spaced a few feet apart.

After 6 hours or more, put the tag back in to sleep mode by holding a magnet against the blue reed switch. Hold the magnet in this position for 10 seconds.

Remove the magnet and check the status of the red LED. In sleep mode the red LED should flash with the characteristic double flash every 10 seconds. If it still flashes once every 4 seconds then repeat.

The tag's location and ARGOS / GSM diagnostic data will update automatically on the SMRU web-site.

7 REBATTERYING A TAG

NOTE: Whilst it is technically possible to re-battery the majority of SMRU tags which use the SAFT LSH20 'D' cell, SMRU take no responsibility for any damage to either the tag, other equipment or personnel involved in the activity.

The SAFT LSH20 uses LithiumThionylChloride technology which is under pressure. If the outer case of the battery is compromised causing it to vent then this presents a very real hazard. Familiarity of the Materials Safety Data Sheet is essential. This is available in a variety of languages from the SAFT website.

Re-battering a tag is a risky business and the tag can easily be damaged. SMRU cannot accept any responsibility for any resulting irreparable damage to the tag.

The following is certainly not a definitive procedure but is a method evolved over time. With exception to the mould, an attempt has been made to use a range of tools commonly found in a well-equipped workshop. Useful tools and equipment as follows:

- Hack Saw
- Vice to clamp the tag whilst working on it
- Hammer
- Large flat-bladed Screwdriver
- Chisel
- Rotary Grinding Tool (e.g. Dremel 184 5947, with grinding bit attachment)
- Soldering Iron & Solder.
- Saft LSH20 Batteries (e.g. http://www.houseofbatteries.com/lithium-lsh20-p-1103-l-en.html) – we have P2 solder tab terminals put on them, but pretty much anything will do as long as you can solder them on to the printed circuit board.
- Epoxy resin (e.g. Farnell 147588) – 100g resin & 33g hardener per tag will be more than sufficient.
- 50ml syringes would be useful
- Iso-propyl alcohol
- Insulating tape
- Quick-set epoxy adhesive (e.g. 406 9592 http://uk.rs-online.com/web/)
- Epoxy resin gun (e.g. 495 1750 http://uk.rs-online.com/web/)
- Stainless Steel Tube (for tags >500m depth rating)
- Kevlar Tape (for tags >500m depth rating)
- Battery Mould (for tags >500m depth rating)

7.1 Battery Removal

To remove the old battery:

Support the tag in an engineering vice – NOTE: Never close the vice jaws tightly on the CTD head as this will almost certainly damage the sensor.

Using the hacksaw, make two cuts across the width of the tag, one on the top of the tag, to the front of the battery, and the second under the battery at the rear of the tag, as shown below.

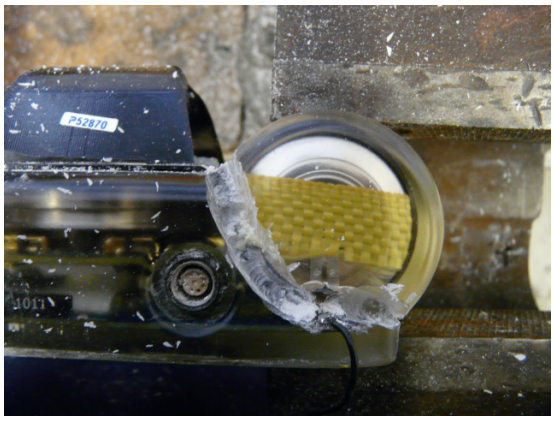
Use the saw very carefully to saw to the battery and no further –

DO NOT SAW IN TO THE BATTERY – the battery is under internal pressure and if vents can be hazardous.

Use the rotary grinding tool to remove the bulk of the epoxy around the rim of the battery, between the two cuts. Remember to repeat for both sides of the tag. It is not essential to remove all the epoxy using this tool. However if insufficient is removed then there is the greater likelihood of damaging the tag when the battery is extracted from the tag.

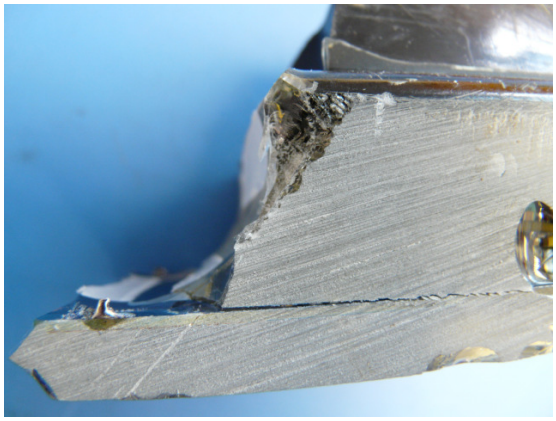
Remember, DO NOT GRIND IN TO THE BATTERY

An alternative to using a grinding tool is to use a hot soldering iron to 'dig away' at the epoxy. This approach is a smelly process and should be done in a well ventilated area. The hazard from the fumes from the hot epoxy are not well understood.



Use a large screwdriver to 'prise' the battery away from the rest of the tag. A light hammer may be required to assist if the battery proves to be a bit stubborn. Try to be careful, remember, the more force applied, or hits with the hammer, the greater the likelihood of damaging the tag. The more epoxy removed in the first place from the edge of the battery, the less force will be required.

The damage most likely to occur to the tag is if the epoxy splits along the length of the PCB, as shown below. If this occurs and the functional testing fails then the tag is effectively ‘scrap’.



7.2 Battery Fitting

7.3 Repotting the Tag